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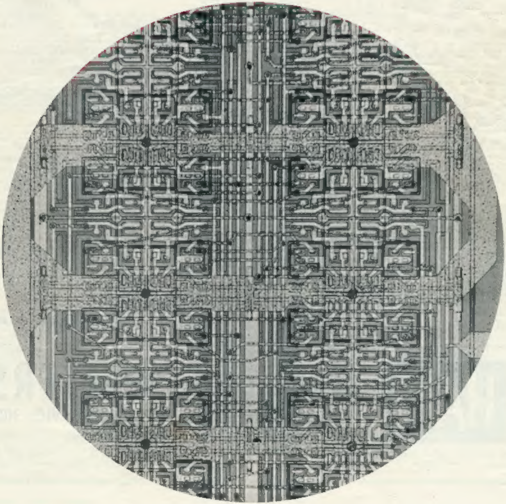

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Meter Movement Internal Resistance: 3,100 ohm plus or minus 3 per cent.
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For D.C. Current range, plus or minus 3 per cent. of specified value.
For A.C. Voltage range, plus or minus 4 per cent. of specified value.
For Resistance range, plus or minus 3 per cent. of scale length.
For Decibel range, plus or minus 4 per cent. of specified value.

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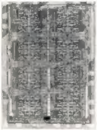
Cover Story



Our front cover this month depicts portion of a recently introduced integration system developed by Fairchild, known as the 4500 "Micromatrix". Designed for large and medium scale integration, the 4500 "Micromatrix" is the first in a series of cellular arrays. It consists of an array of eight identical cells arranged by a 4 x 2 pattern. Each cell contains four, 4-input DTL NAND gates; interconnecton of the gates is performed with a two-layer metalisation to meet various requirements. More about "Micromatrix" elsewhere this issue.


BS
5933

FAIRCHILD DIGEST
Number 1 of a series

VHF-UHF OSCILLATORS

Presented below, for readers of Amateur Radio is a list of Fairchild Semiconductor devices and circuit diagrams for use in the construction of VHF and UHF oscillators. At the foot of the page there are brief specifications for the recommended devices taken from the Fairchild Short Form Catalogue.

2N915-6 — NPN Silicon Planar Transistors designed specifically for **Low Noise** VHF Amplifier and Oscillator applications.

2N918 — NPN Silicon Planar Transistor for use in **1 K MHz Oscillator Circuits** with rise and fall time of less than 2.5 nSecs.

SE1001-2 — NPN Silicon Planar Transistors designed for use in **high power gain,** VHF Amplifier and Oscillator Circuits.

SE1010 — NPN Silicon Planar Transistor designed specifically as **Low Noise** VHF Amplifier and Oscillator.

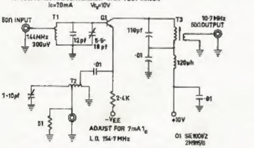
SE3001-2 — NPN Silicon Planar Transistors for use in UHF Oscillator Circuit applications, featuring high power gain, low leakage and typical **fT of 900 MHz.**

SE5022 — NPN Silicon Planar Transistor designed for use as VHF Oscillator and Amplifier, featuring **high power gain at 200 MHz.**

AY7101 — NPN Silicon Planar Transistor designed for **wide band** RF application and VHF Oscillator application.

AY7104 — NPN Silicon Planar Transistor for use in Low Power **non-saturating switching circuits** and VHF Amplifier and Oscillator Circuits.

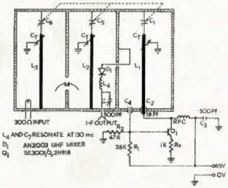
144 MHz TO 10.7 MHz CONVERSION GAIN TEST CIRCUIT



TYPICAL CONVERSION GAIN = 17dB

T1 2.5 turns #18 tinned copper wire tapped 2 turns from Gnd. Coil dia ¼ (inside dia)
T2 4 turns # 18 tinned copper wire tapped ¾ turn from Gnd. end 1¼ turns from Gnd. Coil dia ¼ (inside dia)
T3 Miller Coil Form, Miller Core, Primary 10 turns #26 enameled wire, Secondary 1½ turns #26 enameled wire

SILICON TRANSISTOR UHF TUNER INCLUDING UHF LOCAL OSCILLATOR AND A DIODE MIXER



ELECTRICAL CHARACTERISTICS @ 25°C.						
TYPE No.	LVCEO @ ICmA Volts. min.	hFE min.-max. @ ICmA/VCE Volts.	VCE (sat.) @ ICmA/IBmA Volts. max.	ICBO @ VCB nA	fT min. MHz	Pwr. Total @ 25°C Free Air mW
2N915	50 @ 10	50 @ 10/5	1 @ 10/1	10 @ 60	250	360
2N916	25 @ 10	50 @ 10/1	0.5 @ 10/1	10 @ 30	300	360
2N918	15 @ 3	20 @ 3/1	0.4 @ 10/1	10 @ 15	600	200
SE1001	45 @ 10	40 @ 10/10	2.0 @ 10/1	500 @ 30	200	200
SE1002	45 @ 10	100 @ 10/10	2.0 @ 10/1	500 @ 30	200	200
SE1010	15 @ 10	20 @ 2/10	0.3 @ 10/1	500 @ 15	200	250
SE3001	12 @ 3	20 @ 8/10	0.6 @ 10/1	500 @ 15	600	200
SE3002	12 @ 3	20 @ 8/10	0.6 @ 10/1	500 @ 15	600	200
SE5022	20 @ 1	20-200 @ 4/5	3 @ 10/5	50 @ 10	300	175
AY7101	15 @ 10	20 @ 2/10	0.3 @ 20/2	50 @ 15	400	300
AY7104	45 @ 10	40 @ 10/10	1.2 @ 10/1	50 @ 35	250	300

VK3 V.H.F. GROUP TWO METRE CONVERTER

BY THE PROJECTS COMMITTEE OF THE VK3 V.H.F. GROUP

SINCE the development of a successful 6 metre converter by the then Converter Committee of the VK3 V.H.F. Group, a 2 metre converter has been developed. Design of a 432 Mc. converter is continuing. The design objectives for the 2 metre converter were:

(a) Best noise figure possible consistent with reasonable cost.
(b) Sufficient gain to allow use with tunable i.f. receivers of relatively low sensitivity, such as car radio receivers.
(c) Good cross-modulation characteristics.
(d) Adaptable to a wide range of i.f. output frequencies.

DESIGN CONSIDERATIONS

Semiconductor devices that will outperform the best vacuum tubes are readily available at very attractive prices. Semiconductors are, therefore, the logical choice. There is little to chose between bipolar transistors and field effect transistors on the basis of noise figure. Noise figure is generally regarded as being the most useful figure of merit for devices to be used for v.h.f.-u.h.f. amplifier applications.

A brief discussion of noise may be in order. Any generated signal has associated with it an amount of noise. This noise is unavoidable, since it is generated by thermal agitation in the source impedance of the generator, for example the radiation resistance of an antenna. The theoretical limit to reception is the ratio of signal power to noise power, i.e. the signal to noise ratio.

Just what constitutes a minimum usable signal to noise ratio cannot be specified, since this depends on the type of signal and to a very large extent the person receiving the signal.

Noise figure is the amount by which signal to noise ratio is degraded after passing through an amplifier, and is given by the formula:

$$NF = 10 \text{ Log}_{10} \frac{S_1N_1}{S_2N_2}$$

Where S_1N_1 is the input signal to noise ratio.
S_2N_2 is the output signal to noise ratio.

In general, while the lowest possible noise figure is desirable at 144 Mc., there is a limit to the minimum useful noise figure. In addition to noise due to thermal agitation in the radiation resistance of the antenna and the input stages of the receiver, external noise is also received by the antenna. At 144 Mc. external noise is made up of man-made electrical noise, atmospheric noise and cosmic noise. In quiet locations cosmic noise is the limiting factor.

As the noise figure is lowered, noise introduced by the receiver becomes insignificant in relation to external noise, and further reducing the noise figure brings no real benefit.

In the practical case, lower noise figures may be necessary to overcome unusually high feeder losses.

The noise figure below which cosmic noise is the limiting factor is considered to be 2-2½ db. at 144 Mc.

Accurate measurement of noise figure is quite difficult and the many pitfalls can give rise to conflicting or exagger-

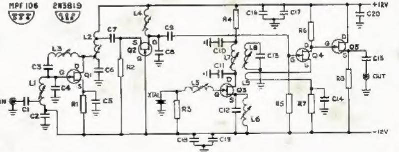
ated claims about receiver performance. Noise figure is generally measured indirectly, by determining the amount of extra noise necessary to double the noise output of the receiver. The technique used must not rely upon assumed linearity of the receiver.

Equipment used to obtain noise figures quoted for prototypes was:

(a) Hewlett Packard noise source, diode type, HP343A.
(b) Hewlett Packard noise figure meter type HP340B (22 Mc. i.f.).

Converter gain must be sufficient to override noise generated by the tunable i.f. and in addition must provide sufficient signal so that the total amplification makes any signal above the noise audible. Approximately 20 db. gain is quite adequate for use with any communication receiver, however since car radios and other less elaborate receivers are likely to be used, considerably more gain than 20 db. is desirable. One microvolt into a converter with 35 db. conversion gain will produce an output of 87 microvolts at the i.f. frequency.

Susceptability to cross-modulation is determined by the shape of the transfer characteristic of the device concerned. Because of the approximate square law characteristics of FETs, their use significantly reduces cross-modulation problems.



Circuit of VK3 V.H.F. Group 2 Metre Converter

R1—220 ohms.	C1—470 pF.	C11—3.3 pF.	Q1—MPF106.
R2—2.2K ohms.	C2—1000 pF.	C12—22 pF.	Q2—MPF106.
R3—390 ohms.	C3—470 pF.	C13—3.3 pF.	Q3—2N3819.
R4—470 ohms.	C4—3.3 pF.	C14—1000 pF.	Q4—MPF106.
R5—100K ohms.	C5—1000 pF.	C15—4700 pF.*	Q5—2N3819.
R6—10K ohms.	C6—3.3 pF.	C16—1000 pF.	Xtal—See text.
R7—10K ohms.	C7—470 pF.	C17—0.047 uF.*	Coil Data—See Table.
R8—3.9K ohms.	C8—3.3 pF.	C18—0.047 uF.*	Capacitors marked *
Resistors ¼ watt.	C9—470 pF.	C19—1000 pF.	Red Cap, others
	C10—1000 pF.	C20—1000 pF.	Disc Ceramic.

For optimum performance, the lowest intermediate frequency is limited by the bandwidth of the converter. Noise is additive on a power basis and if the first image band falls within the bandwidth of the converter, image noise will add to noise already associated with the signal, reducing the signal to noise ratio. For the worst possible case signal to noise ratio may be degraded by 3 db.

DESCRIPTION

In view of the above considerations, it was decided to use field effect transistors in the design. Evaluation of the specifications of available FETs resulted in the use of the MPF106 N-channel junction FET (Motorola) for r.f. amplifier and mixer functions. The 2N3819 N-channel JFET (Texas Instruments) was chosen for oscillator and source follower.

The first amplifier stage uses an MPF106/2N5485 (Q1) in neutralised common source configuration. Neutralisation could have been avoided by the use of dual gate metal oxide insulated gate FETs (MOS-FETs), however consideration of noise figure and the ease of neutralisation with the circuit used led to the choice of the MPF106 JFET. Neutralisation is accomplished by adjustment of L3, which resonates with the drain to gate feedback capacitance to form a high impedance parallel resonant circuit at 144 Mc.

Signal is taken from L2 in the drain circuit of Q1 via C7 to the source of Q2, a second MPF106. The second stage is in grounded gate configuration, forming with Q1 a shunt fed cascode r.f. stage. Signal is taken from L4 in the drain of Q2 via C9 to the gate of Q4, the mixer. Oscillator injection is via a link on L8 into the source of Q4.

Intermediate frequency output appears across R6 in the drain circuit of the mixer, while a direct coupled source follower (Q5) transforms the i.f. band to a low impedance for use with coaxial cable.

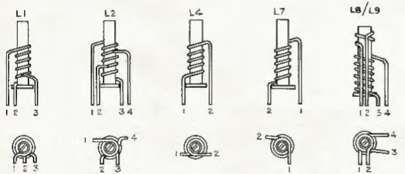
The crystal oscillator circuit requires some comment. A single FET is used as both oscillator and multiplier. The circuit is designed for use with third overtone crystals in the range 38-48 Mc. Adjustment of oscillator to exact frequency is possible with adjustment of L5. If this facility is not required, L5 may be replaced by a link and the value of R3 increased to 56K ohms.

The third harmonic of the crystal frequency is selected by L7. The double tuned circuit coupling of L7, L8, L9, results in a "clean" injection waveform at the source of the mixer. Fifth overtone crystals of about 61 Mc. have been used, with doubling in Q3, but insufficient information is available for success with this range to be guaranteed. No changes to coil dimensions were required.

A supply of 9-15v. at 10-20 mA. d.c. is required. The design voltage is 12v. Positive and negative supply rails are d.c. isolated from earth, giving greater flexibility in application. Should this not be required, the appropriate bypass capacitors may be replaced by short wire straps.

The converter is constructed on an epoxy fibre-glass printed circuit board 4" x 2½", which is the same size as the VK3 V.H.F. Group 6 metre converter. All capacitors below 100 pF. are NPO disc ceramics. Above 100 pF. Hi-K disc ceramics are used. Resistors used must be of small physical dimensions. Ratings up to ¼ watt are suitable. The coil formers used are Neosid type A (single assembly) and the type B (double assembly) with screening cans. The bases usually provided have not been used, so as to maintain high unloaded tuned circuit Q. Instead, the boards are drilled 7/32" and the formers glued in. F29 v.h.f. slugs are used throughout. Coil dimensions are given.

COIL DATA



L1	L2	L4	L7	L8/L9
1—Gate Q1. 2—Minus 12v. 3—Aerial.	1—3.3 pF. (C8) 2—470 pF. (C7) 3—Plus 12v. 4—Drain Q1.	1—Drain Q2. 2—Plus 12v.	1—470 Ω (R4) 2—Drain Q3.	1—Source Q4. 2—10K Ω (R7) 3—3.3 pF. (C13) 4—Earth.
L1—5¼ turns 22 s.w.g. T.C. tap (3) ¾ turn from cold end.	L2—5½ turns 22 s.w.g. T.C. Tap (2) 1¾ t. from cold end, tap (4) 1¼ t. from hot end.	L4—4¼ turns 22 s.w.g. T.C.	L7—5½ turns 22 s.w.g. T.C.	L8—6½ turns L9—1¾ turns spaced 1/16" from L8. Both 22 s.w.g. T.C.

L3—15 turns of 30 gauge B. & S. enamel, close wound.
L5—18 turns of 30 gauge B. & S. enamel, close wound.
L6—13 turns of 30 gauge B. & S. enamel, close wound.

All coils are wound on Neosid formers with type F29 cores.

L1, L2, L3, L4, L5, L6 are in single cans. L7, L8, L9 in one double can.

The turns on L1, L2, L4, L7, L8 are spaced to cover ¼" winding to commence at base of former.

PERFORMANCE

All prototypes were measured with noise figures in the vicinity of 2 db. The minimum noise figures of two of the prototype converters were 1.6 db.

The gain of the converter is adequate for all reasonable applications, with protoypes having measured conversion gains in excess of 35 db. With all tuned circuits peaked for 144.25 Mc., 3 db. bandwidth was 540 Kc. The noise figure was substantially constant over this range. The 10 db. bandwidth was 1.4 Mc. The bandwidth is quite adequate for operation in the normally used part of the band, and allows the use of i.f's down to the broadcast band. Greater bandwidths may be obtained by stagger tuning, with some sacrifice in gain and noise figure.

No measurements of cross-modulation have been performed. Qualitative tests indicate that cross-modulation performance is very good. No diode protection at the input of the converter was found necessary, even when used with transmitters of over 100w. input.

CONSTRUCTION

Complete construction details will be supplied with the kits which will be made available. For those not wishing to obtain the kit, a few hints may be helpful.

First, all minor components should be soldered in. Locating lands on the Neosid formers should be filed off and the formers glued in place with Araldite, making sure that the former lines up correctly with the position of the can.

Care must be taken when soldering in the FETs, to prevent damage due to excessive leakage current from soldering iron tip to earth if a Scope soldering iron is used. The board should be isolated from earth while soldering the FETs in place. No special precautions are necessary when handling the FETs used, however for best performance they should be pushed down to within 1/8" of the board. The FETs are guaranteed by the manufacturer to sustain 260°C. lead temperature 1/16" from the body for 10 seconds. A Scope soldering iron with clean, pointed instrument tip is suitable.

ALIGNMENT

With supply connected to the completed converter, L5 and L6 should be tuned for maximum voltage across R4. The 5 volt range of a multimeter is suitable. Approximately ½ volt change should be evident. With the voltmeter connected across R7, L7 and L8 should be adjusted for maximum reading (approximately ¼ volt change). Some particularly inactive crystals may be made to work by increasing the value of R3 from 390 ohms to 1K ohms.

Connect antenna to converter and output of converter to the tunable i.f. Using a suitable signal source—signal generator, early stages of own transmitter or a strong local signal—adjust the other coils in order L4, L2, L1. If the converter oscillates adjust L3 to restore stability. Re-peak all coils and neutralising for best results. Final alignment may be carried out with a simple noise generator if available.

A number of kit sets have been made available to members of the VK3 V.H.F. Group. A further limited number of kits will be made available by post at a price of $12.50 including postage. The kit is complete except for the crystal.

Because of the large number of specialised components, it was decided to make available the full kit comprising drilled board, resistors, capacitors, FETs, co-axial and crystal sockets, coil former assemblies and incidental bits.

Inquiries should be addressed to:

"Two Metre Converter,"
W.I.A., Vic. Div.,
P.O. Box 36, East Melbourne,
Vic., 3002.

OBITUARY

MAX FOLIE, VK3GZ

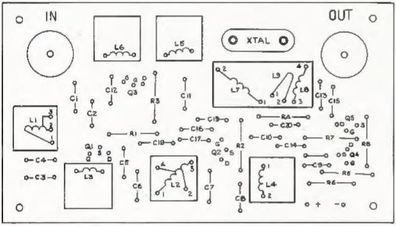
The death occurred on 28th December of Max Folie, VK3GZ, at the age of 59.

Born in Richmond, Victoria, in 1909, he was educated at Surrey Hills State School, Scotch College and the Royal Melbourne Technical School. He studied Radio Engineering and was an associate member of the Institute of Radio and Electronic Engineers of Australia. He joined the Wireless Institute of Australia in February 1946.

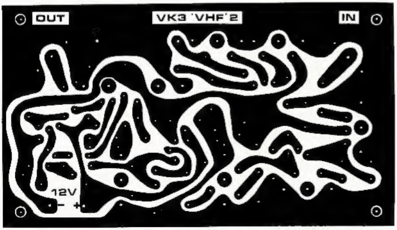
Max had many interests and although he had only limited time to devote to Amateur Radio, was at the time of his death trying to organise a radio club in Mildura.

Max entered the field of commercial radio in 1932 when he was appointed engineer to 3YB, when he installed a station in a railway carriage which visited and transmitted from many country towns. He built the first equipment for 3MA Mildura when the station was formed in 1933. At the time of his death he was managing director of Sunraysia Television Ltd. STV8, with which company he had been for the last four years.

Members of the Wireless Institute of Australia regret the passing of another of our pioneers and extend their sympathy to his family.



Layout of the VK3 V.H.F. Group 2 Metre Converter



Modified Printed Circuit Board of the VK3 V.H.F. Group 2 Metre Converter

FAIRCHILD WINS TOP AWARD

An advanced integrated circuit array developed by Fairchild Semiconductor was acclaimed as one of the 100 most significant technical products of 1968 in the Annual National Research Week competition held recently in New York.

Fairchild's winning entry was the 4500 Bipolar "Micromatrix" Array, a monolithic semiconductor device that provides the electrical equivalent of 352 transistors, resistors, diodes and other components, all interconnected to provide a desired function. "Micromatrix" is a new design technique that utilises computer aided design facilities to achieve low production costs and fast deliveries on order.

The 4500 "Micromatrix" Array is a highly complex unit, which incorporates a standard semiconductor base with unique two-level wiring interconnections, designed to a customer's specifications. It consists of eight distinct cells on a silicon chip, and, apart from its package, is no larger than the head of an ordinary pin.

The only integrated circuit among the 100 products selected, the 4500 features exceptional reliability and a high degree of logic compatibility with other circuits.

SOLID STATE COUPLING METHODS*

The whys and wherefore of coupling circuits in solid state i.f. amplifier design

JOSEPH TARTAS, W2YKT

ABOUT seven years ago, I made a prediction in some material I was writing about t.v. servicing, that, "Undoubtedly transistors will eventually replace tubes in all of the t.v. circuits but the c.r.t. itself." Not only has this prediction come true, but at some future date, this may well be remembered, not as the Space Age, but as the **Semiconductor Age**. Each new development in the transistor line presents a different problem to the circuit designer; the bipolar transistor, the FET and the IC.

As the usable frequency spirals upwards, the input and output circuits must be altered to compensate for different input and output impedances. Input, output and feedback capacitances (by whatever the name) and methods of coupling to achieve the desired gain and bandpass characteristics also change.

COMPARISON TO VACUUM TUBE I.F. CIRCUITS

The transistor has been considered as essentially a current amplifier. As an i.f. amplifier, however, its sole purpose is to provide a sufficiently high **voltage** level at the detector input. It may be regarded, except for the considerations to follow, to be similar to vacuum tube voltage amplifier circuits.

Tubes have relatively high input **and** output impedances. Bipolar transistors, in the more useful configurations, have **high output** impedances (although considerably lower than that of tubes), but, unfortunately, have quite low input impedances. FETs on the other hand, have semiconductor characteristics, but with impedances higher even than vacuum tubes.

Because the transistor is basically a power amplifier, the maximum transfer of power occurs when the coupling network is matched, both to the output of one stage and input of the next stage. In addition to impedance matching, the resonant frequency of any tuned circuit connected to the transistor must be considered. The output capacity of most transistors is low, but the input capacity is often higher than those of tubes, as much as 30 pF. in some types. These capacities must be considered since they are part of the total tuning capacity across the coils in i.f. amplifiers.

Of the three possible circuit configurations, common-base, common-emitter, and common-collector, the common-emitter circuit is almost exclusively used for i.f. circuitry. It is the common emitter circuit that produces a high voltage gain as well as the greatest power gain of the three configurations.

Another advantage in using the common emitter circuit is the possibility of isolation due to the physical layout of the transistor terminals. Reference to Fig. 1 shows that a shield partition may be used to completely isolate the input circuit consisting of the base circuit (which is also the collector or output circuit if another stage precedes it) and the emitter circuit, from the output, or collector circuit. In tetrode transistors the additional lead does not prevent use of the shield, but also provides a separate element for a.g.c. control that is completely isolated from the active r.f. circuit elements.

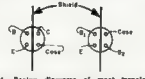


Fig. 1.—Basing diagrams of most transistors are alike except for the ground lead or the extra base connection in the tetrode.

Until recently, the collector of a triode transistor was tied to the case and presented a problem in shielding. Now, many r.f./i.f. types have the case isolated from the transistor elements and it can be grounded through a fourth lead connected to the case.

OUTPUT CIRCUITS

The output impedance of the transistor in an L-C tuned amplifier is sufficiently high that the tuned circuit could be represented as in Fig. 2, and is essentially the same configuration as for a vacuum-tube circuit. The value of R would be higher than the impedance of the L-C circuit or omitted, depending upon the desired loading, the loading effect of the collector, and the means by which it is coupled to the following **base**.

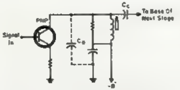


Fig. 2.—Output circuit of a transistor i.f. stage. The output capacity is identified as C_O.

INPUT CIRCUITS

In order that the low impedance input of the transistor does not excessively load the tuned circuits, thereby reducing the gain, some means of impedance matching must be resorted to.

There are three ways in which the proper match may be achieved. To better understand these methods, consider the various relations of the parallel tuned resonant circuit shown in Fig. 3.

At Resonance:
$X_L = 2\pi FL = X_C = \frac{1}{2}\pi FC$
Unloaded $Q = X_L/R = X_C/R$
$Z_{Resonance} = X_C I_C/I_G = X_L I_L/I_G$
$Z_{Resonance} = QX_L = QX_C$

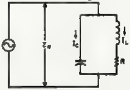


Fig. 3.—A parallel tuned circuit and its various current, voltage and impedance relationships.

At resonance, the inductive and capacitive reactances are equal and the resonant impedance, Z_R, is the product of the coil Q (determining the bandwidth) and the reactance of **either** element since they are equal at resonance. The Q is the ratio of the tank current (I_L or I_C) to the total current from the generator. Since the current I divides, the ratio of the currents in each branch depends upon the ratios of reactance and resistance present in the tank circuit. If the generator is considered to have a very high impedance, then the signal may be injected between the common terminal and terminal 1, 2, or 3 in Fig. 4, without affecting the resonant frequency, unloaded Q, or resonant impedance of the tuned circuit, since $Z_T = Z_1Z_2/Z_1 + Z_2$ as in parallel resistance.

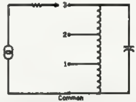


Fig. 4.—Impedance matching by means of a tapped inductor. The tap impedance equals $Z_R\ (N_T/N)^2$ where N_T is the number of turns from [redacted] and N is the total turns.

Since the inductance of a coil varies as the square of the number of turns, the inductance, and hence the reactance and impedance at points 1, 2, and 3, will be one ninth, four ninths, and the total impedance respectively. Other arrangements are equally possible, i.e. a centre tap gives one-fourth the total impedance, etc.

The tuning capacity (where used) may be employed in a similar way to divide the total impedance, as shown in Fig. 5A. If the resultant capacity is the tuning capacity, the r.f. voltage across the tuned circuit is divided in the ratio of capacitive reactance, or the inverse of the capacity ratios, since:

* Reprinted from "CQ," July 1968.

$$\frac{IX_{C1}}{IX_{C2}} = \frac{E_1}{E_2};$$

$$\frac{X_{C2}}{X_{C1}} = \frac{\frac{1}{2\pi f C_2}}{\frac{1}{2\pi f C_1}} = \frac{C_1}{C_2}$$

Stagger tuned i.f's, as found in t.v. circuits, use the tube capacity (plus strays) as the only resonating capacity. In transistor circuits the input capacity is often much higher, but as seen in Fig. 5B, this capacity may be used as part of the impedance divider. If this capacity is too small, additional capacity may be used across the input, or the coupling capacitor that forms the other part of the divider may be made sufficiently small to give the proper division. When the tuning capacity consists mostly of a large fixed capacitor across the coil, this divider has little effect on the tuning if a small coupling value is used. See Fig. 6 for typical values.

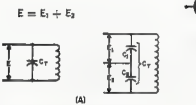


Fig. 5A.—Impedance matching by means of a capacitive divider.

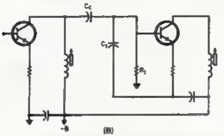


Fig. 5B.—Typical circuit uses the coupling capacitor, C_C and the input capacity Ci to form the impedance divider.

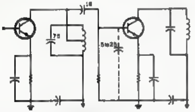


Fig. 6.—Typical capacitor divider circuit and values.

DOUBLE-TUNED CIRCUITS

Basically, the tuning and coupling of tuned pairs are accomplished the same way as for tube circuits. The only difference in their application to transistor circuitry is in the means of loading.

Fig. 7 shows the way in which a transistor with output impedance R_o and capacitance C_o is connected by means of a tap to the primary. The secondary is connected to another transistor stage with equivalent parallel input resistance R_i and capacitance C_i. The primary tap is usually at or near the top, due to the fairly high value of R_o. The secondary tap will normally be placed well below the middle of the coil to provide the desired amount of loading, since R_i is low, compared to R_o. The coupling may consist of either capacity or mutual inductance.

SINGLE-TUNED TRANSFORMER COUPLING

An alternate method of matching a single tuned circuit to the input impedance of another transistor is by means of transformer coupling where the secondary and primary are tightly coupled but has a step down ratio. The step down ratio of the transformer should be equal to the square root of the ratio of output to input impedance of the transistors. This, in turn, gives the number of turns for the secondary, if the number of primary turns is already known. In this case the secondary is untuned, as shown in Fig. 8.

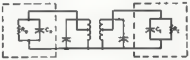


Fig. 7.—Equivalent circuit of input and output matching with a tuned pair. The coupling between the two coils is discussed in the text.

NEUTRALISATION OR UNILATERALISATION

Unlike the vacuum tube, the transistor is not a unilateral device, i.e. current can flow in both directions, even though small. Because it can do this, the output voltage variations cause variations at the input of the same transistor. The result is a feedback voltage that is, unfortunately, in phase and therefore **regenerative.** If this feedback voltage is large enough, the amplifier goes into oscillation. Just as in tube amplifiers, the feedback is large at higher frequencies, and if the frequency is low enough, the feedback voltage is too small to be of consequence. The equivalent feedback circuit of the common emitter circuit of Fig. 9A is shown in Fig. 9B.

The capacity of the base-collector junction, C_{CB}, is small and of little consequence at low frequencies. The resistor it shunts, R_{CB}, is very high and is of little consequence under normal operation when reverse bias is applied to the base-collector junction. As the frequency increases, the capacitive reactance decreases, until such a frequency is reached where the impedance becomes lower than the value of R_{CB} and feedback occurs. The base spreading resistance R_B, produces a positive feedback voltage due to the collector current passing through C_{CB}.

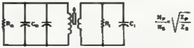


Fig. 8.—Transformers with untuned secondaries are often used for impedance matching. The formula governing the relationship between the primary and secondary impedances is shown above.

Since we are interested in the use of these circuits at reasonably high frequencies some means must be used to prevent the occurrence of regeneration and oscillation. This method is known as **unilateralisation** when **all** the input changes due to feedback, **both resistive and reactive** are cancelled. If only the reactive changes are cancelled, they are said to be **neutralised.**

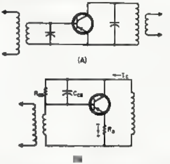


Fig. 9A.—Simplified common emitter amplifier.
Fig. 9B.—Common emitter equivalent high frequency circuit showing the elements that produce feedback.

To some readers who are familiar with transmitter circuitry, the methods used for unilateralisation and neutralisation will be familiar. For reasons previously given, the common-emitter amplifier only will be discussed, although the following methods will apply equally to the common-base amplifier.

Fig. 10 shows a typical i.f. stage using transformers with untuned secondaries for the input and output circuits. The input signal is a.c. coupled by means of the step down secondary winding, through the d.c. blocking capacitor, C_B, to the base. The transistor is forward biased by means of the resistor R_B and the supply voltage. This provides the proper bias voltage between the base and emitter. The

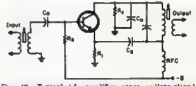


Fig. 10.—Typical i.f. amplifier stage unilateralised by partial emitter degeneration. Components R1, R2 and C_N form the unilateralising network.

unbypassed resistor, R1, in the emitter provides degeneration and reduces the positive feedback produced in the base spreading resistance within the transistor structure itself. Resistor R2, in conjunction with C_N, the neutralising capacitor, produces an additional negative feedback due to collector current that is directed back to the emitter.

(Continued on Page 15)

PUTTING THE GELOSO G222 ON 160 METRES

J. A. ADCOCK, VK3ACA*

In view of the general acceptance of sideband and the prospect of the Geloso becoming obsolete, it was decided to carry out modifications to make it more versatile. Rather than shelve or sell a useful piece of equipment, it can be adapted to perform a function not normally covered by the s.s.b. transceiver. Although modifications were carried out to a complete Geloso transmitter, the information should be of equal interest to people with the Geloso v.f.o. only. The observations on stability should be of interest together with others recently appearing in this magazine.

The aim of the modifications were:

1. Introduce coverage of the 160 metre band without altering the existing coverage of six bands or the v.f.o. calibration.
2. Improve the general stability of the v.f.o.

It might be considered unnecessary to preserve operation on the 27 Mc. band, however it was found practical to retain this band without introducing an extra switch position. Under the re-arranged scheme both band switches, exciter and final, have been altered as follows:

Band	Old Scheme	New Scheme
1	80 mx	160 mx
2	40 mx	80 mx
3	20 mx	40 mx
4	15 mx	20 mx
5	11 mx	15 mx
6	10 mx	11 & 10 mx

MODIFICATIONS TO THE FINAL TUNING

It is quite simple to cover 10 and 11 metres on the one tap of the final tuning tank. The 11 metre tap was removed completely. In this case it was found desirable to re-locate the 10 and 15 metre taps at points indicated in Fig. 1.

An extra coil must be wound for the 160 metre band. With the existing tuning capacitance, the L/C ratio was found to be too high and thus an extra capacitance must be switched in parallel. To achieve this, an extra switch wafer was added to the final range change switch. This is fairly easy to do if one has an old two-bank 6 or 12 position Oak switch. I was fortunate in having such a switch with a ceramic wafer which was ideal for the purpose.

Having the spare switch and using some of the parts of the existing switch, including the tap shorting wafer, it is not difficult to engineer the new switch (Fig. 3). It will probably be necessary to use the new clicker plate and shaft because of the unusual driving shaft on the original switch. To engage the original wafer a double flat should be filed on the switch end of the shaft.

The extra coil was wound on a 1½" diam. bakelite tube (Fig. 2) and this was mounted vertically between the 6146, the tuning capacitor and the filter capacitor. It was attached to the chassis by means of a right angle brass bracket. The actual winding was close to the top end of the former and mounted so that it was close to the end of the existing coil.

Having made coil, obtained the extra capacitors and re-modelled the switch, one should proceed as follows (see Fig. 1).

Remove all taps from the switch except the 10 metre tap. Discard the 11 metre tap and shift all remaining taps around one position on the switch. Connect the lower end of the new coil to the 80 metre end of the old coil and the free end of the new coil to the shorting wiper of the switch. Connect the ceramic capacitors so that they are switched in parallel with the tuning capacitor in the 160 metre position.

It should also be noted that the variable coupling capacitor may have to be considerably greater on 160 metres. In this case the extra capacitance was included in the aerial tuning unit.

ALTERATIONS TO EXCITER

At first sight it might appear necessary to provide a completely new oscillator section, however if the 3.5 to 4 Mc. coil is removed and replaced by one of four times the inductance, without changing any capacitance values, exactly half the frequency and range will be covered, namely 1.75 to 2 Mc. It is now possible to cover the 80 and 160 metre bands with the same oscillator coverage, using the "intermediate" tuned circuit as either a straight amplifier or doubling to 3.5. (The terminology used here is that used in the Geloso manual.) The same scale can still be used for 3.5 to 4 Mc. and an extra scale can be marked below this scale from 1.8 to 1.9 Mc., exactly half 3.8 to 3.8 Mc.

In the new arrangement two extra coils must be introduced; one to cover 1.8 Mc. at the driver stage and an extra tuned circuit for 3.5 Mc. at the intermediate tuning position. At this position resistance coupling was tried, but this was inadequate at 3.5 Mc. In the original circuit, this stage is tuned by internal capacitance of the coil only. It was found to be impossible to make the new coil for 3.5 Mc. resonate in this way, but the non resonant coil was found to be quite adequate

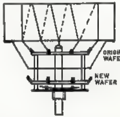


FIG.3 EXISTING TANK COIL.

The new oscillator coil for 1.75 Mc. was wound on a fairly large diameter former, and after some experiment, with a slug. In this case it was found to be best in the interests of stability. The absence of a slug does introduce some difficulty in tuning and to this end one turn may have to be either added or removed to obtain the correct scale law in conjunction with the trimmer. Having settled on the new coil, the trimmer should be satisfactory for frequency adjustment.

Table 1 is a tabulation of original and new circuit tuning ranges.

Band Mx	Oscillator Mc.	Intermediate Self Reson. Mc.	Driver Mc.
Old arrangement:			
80	3.5-4.0	resistance	3.5-4.0
40	3.5-3.65	7.0-7.3	7.0-7.3
20	" "	" "	14.0-14.6
15	" "	" "	21.0-21.9
11	6.74—	13.48-13.6	26.96-27.23
10	—7.425	14.0-14.85	28.0-29.7
New arrangement:			
160	1.75-2.0	resistance	1.75-2.0
80	" "	3.5-4.0	3.5-4.0
40	3.5-3.65	7.0-7.3	7.0-7.3
20	" "	" "	14.0-14.6
15	" "	" "	21.0-21.9
11, 10	6.74-7.425	13 48-14.85	26.96-29.7

Table 1.

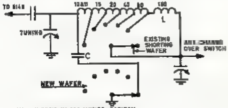


FIG.1 SWITCH IN 160 METER POSITON

C—New capacitor, 200 pF. low K high voltage ceramic.
Tapping points:
10 and 15 metres—turn 4.
15 metres—turn 6.
20 to 80 metres—no change.
L—New coil, 25 turns of 22 B. & S., close wound, on a 1½ inch bakelite former.

EXTRA TANK COIL

* P.O. Box 106, Preston, Vic., 3072.

EXCITER MODIFICATION PROCEDURE

Wind the coils as described in Fig. 4. First let us deal with the driver tuning and switch wafer No. 3. Remove the 11 metre connection to the switch and shift all connections around one step, leaving the first position vacant. It will be noticed that the shorting sector does not bridge position No. 5 (now 15 metres), but this is of little consequence. Place the new coil L12 in a position between L10, the frame and wafer No. 3. The coil will be found to work satisfactorily although there is only ½" space. (Note position 1 is taken as the 160 metre end of the switch.)

Next let us deal with the intermediate tuning position and switch wafer No. 2. The 11 metre tap on L4 must be disconnected. Some attention must be paid to the shorting sector on the back of the switch. Although not shown in the circuit diagram, this section is used to short out L5 when not in use. In the new circuit this would short out L5 in the 15 metre position. It is easily disconnected by bending the contact clip back out of the road on the shorting side of the switch. This is most important. (It is the only contact clip in use on this side.)

Shift connections from L5 around one step, the circuitry remaining unaltered, and leave the resistor in position 1 intact. This leaves the second position vacant.

The 3.5 Mc. oscillator coil occupies the position in front of the coil line up and this should be removed in order to wind L11. Shift coils L1 and L3 along one position, leaving a gap between L3 and L4. Into this gap is placed the new L11 which has been wound on L2 former. L1 and L3 may both be replaced as discussed in the section on stability. L11 is wired into the circuit with its associate resistor to the vacant position 2 on bank 2.

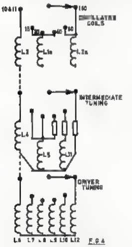


FIG. 4

3 BANK RANGE CHANGE SWITCH

Refer to manual for details.

COIL DATA (Coils not listed remain unaltered):

L2A replaces L2.—Wound ¼ in. from the top of ¾ in. diam. polythene former; total height 1½ in., wind. ½ in., close spaced, 34 B. & S. enamel wire. Remove turns as required.

L1A (optional, see notes on stability) replaces L1. Wound ¼ in. from the top of ¾ in. diam. polythene former; total height 1½ in.; wind 36 turns of 26 B. & S. enamel wire. Remove turns as required.

L11.—Wound on former of old L2, retain slug tuning. Fill winding space with a single layer of close spaced 34 B. & S. enamel wire.

L12.—Wound on a 7/16 in. diam. slug tuned former. Wind 1⅛ in. of a single layer of close spaced 34 B. & S. enamel wire.

L4.—Leave off 11 metre tap.

OSCILLATOR CONVERSION

Lastly, let us deal with the oscillator conversion and switch wafer No. 1. It is necessary to locate the new oscillator coil as far from the sides of the shield box as possible and as close to all associate circuitry as possible. The earth point of the 1,000 pF. mica capacitor must be moved to the tag strip directly across N555 to make extra space.

In this case the new L2A coil is placed directly in front of the cord drive spindle and close to L3 and the 6CL6 socket. There is still room for two new coils, L1A and L3A if required. L1A next to L2A and between the 1,000 pF. mica capacitor and the cord drive shaft, and L3A somewhere in between the old position of L1 and L2.

Connections to No. 1 wafer of the switch: The 11 metre connection is removed and connections to L1 are moved around one position, the new L2A is connected to positions 1 and 2 of switch wafer.

STABILITY

There has always been some problem of stability in this unit and the following points were noted. The new coil L2A was much more stable than the old L1 coil, especially when using no slug. This latter effect could have been a characteristic of the coil former and slug type used. However, the larger the diameter of the coil the more stable the results. It was decided to try a new coil L1A and a similar improvement was observed.

It was also observed that there was considerably more erratic drift with the shield box in place. This defect was found to be due to intermittent contact around the perimeter of the shield. This problem was overcome by lining all contact surfaces with cellulose tape so that it only made contact with the two attaching screws.

TUNING

The intermediate and driver tuning is quite straight forward and can be carried out with slug adjustment. There was some lack of drive at the ends of the range 27 to 29.7 Mc. and if it is necessary to fully cover this range, a two-coil resonant circuit could be tried at the intermediate position. With L4 peaked on 28 Mc. there was sufficient drive between 27 Mc. and 29 Mc.

There are some problems in tuning the new oscillator coils without a slug. The tuning range on each band is dependent on a balance between the inductance of the coil and the capacitance of the variable trimmer. The simplest way to correctly tune the coils is, before removing the old coil, correctly adjust the variables to give the correct scale calibration. Wind the new coil and remove turns until the frequency at the bottom end of the scale is the same as before. Final check must be made with the cover in place.

It is not possible to get the frequency exactly as before and any small error can be corrected for with the trimmer.

If it is found that the tuning range is either longer or shorter than the calibrated scale, further adjustments must be necessary. Starting with the low end frequency adjusted correctly with the trimmer, if the top end frequency falls short of the calibration mark, turns must be removed from the coil and the trimmer re-adjusted. Conversely, if the top end frequency falls past the calibration mark, turns must be added. This is a tedious job and must be carried out with patience. If adjustments as described in the previous paragraph are carried out, these extra adjustments should be unnecessary.

This article should be of interest to most people with Geloso's, so good luck with your conversions and see you on 160 metres.

AMATEUR FREQUENCIES:
ONLY THE STRONG GO ON—
SO SHOULD A LOT MORE AMATEURS!

CHANGE OF ADDRESS

W.I.A. members are requested to promptly notify any change of address to their Divisional Secretary —not direct to "Amateur Radio."

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

PHONE

VK5MS	315/330	VK6AB	288/314
VK3AHO	312/336	VK4FJ	285/304
VK6RU	308/333	VK4TY	275/278
VK4HR	304/329	VK3TL	271/277
VK6MK	304/323	VK2APK	269/274
VK3JZ	303/330	VK2AAK	266/273

New Member:
Cert. No. 93 VK4XY 115/119

Amendment:
VK3ZE 197/200

C.W.

VK2QL	300/322	VK3YL	266/283
VK3AHQ	292/306	VK3ARX	266/275
VK4FJ	290/314	VK6RU	266/289
VK3CX	289/312	VK2APK	265/273
VK2AGH	282/296	VK3NC	264/277
VK4HR	276/299	VK3XB	263/277

New Member.
Cert. No. 94 VK4XJ 124/130

OPEN

VK2AGH	311/331	VK4TY	301/315
VK6RU	310/335	VK4FJ	298/322
VK4HR	309/333	VK3ARX	289/298
VK6MK	305/334	VK3TL	287/293
VK2VN	304/321	VK2APK	286/296
VK2EO	302/325	VK3XB	286/274

New Member:
Cert. No. 115 VK4XJ 166/173

PROJECT—SOLID STATE TRANSCEIVER

PART FOUR *H. L. HEPBURN,* VK3AFQ, and K. C. NISBET,† VK3AKK*

This month's article will deal with five separate functions:

(a) The filter pre-amplifier.
(b) The transmitter mixer pre-amp.
(c) The carrier oscillator/BFO.
(d) The product detector.
(e) The balanced modulator.

Although these functions will be described separately, they are in fact combined on to three printed circuit boards. One board contains the filter pre-amplifier and the transmitter mixer pre-amplifier, a second p.c.b. houses the carrier oscillator/b.f.o. and an amplifier while the third board contains the product detector and balanced modulator.

The second and third boards are housed in a 6½" x 4½" die cast box to prevent radiation into the rest of the circuitry of the transceiver.

THE FILTER PRE-AMPLIFIER

The prime function of this module is to raise the output of the balanced modulator to a reasonable level prior which, in series, tune the drain coil L23 to 9 Mc.

The function of D6 is explained later in this article, but D7 and D8 need comment.

When in the "receive" mode the amplifier gets its h.t. from the a.g.c. rail and its gain is thus controlled by the a.g.c. system. The a.g.c. rail, however, is only operative on receive. On transmit the amplifier is fed from the transmit h.t. line and is not a.g.c. controlled.

On receive diode D7 gates the a.g.c. "h.t." voltage to the amplifier while D8 prevents excitation of any transmit functions through the supply line.

On transmit, the situation is reversed with D8 conducting and D7 blocking off the a.g.c. rail.

THE TRANSMITTER MIXER PRE-AMPLIFIER

This stage is used to raise the 9 Mc. s.s.b. output from the filter board to a suitable level for the various transmitting mixers.

Two courses of action were available. Either the low level s.s.b. output from the filter could be mixed to signal frequency and then amplified or it could be amplified first and then mixed to signal frequency.

The latter course was chosen on the grounds of economy for, since there is a separate mixer/pre-amplifier for each Amateur band, it would otherwise have been necessary to use four additional amplifier stages rather than one. It is also simpler to provide gain at 9 Mc. than at the higher Amateur frequencies.

As shown in Fig. 11 the amplifier consists of a Motorola 1550G integrated circuit and a 2N3564 emitter follower.

Input from the filter board is "gated" by D9 to a low impedance link on T4. The secondary of T4 is tuned to 9 Mc. by the 68 pF. parallel capacitor.

Output from the i.c. is capacitively coupled to the base of the 2N3564 emitter follower, the collector of which is earthed for r.f. by the 5 uF. tantalum capacitor.

Output is approximately 1.5 volts peak to peak into a 100 ohm load.

When h.t. is applied to the unit on transmit, diode D9 is switched on, allowing signal to get to the i.c. On receive, this h.t. is removed, D9 is switched off and the i.c. effectively isolated.

THE CARRIER OSCILLATOR/BFO

Fig. 12 gives the circuit diagram from which it can be seen that each carrier crystal has its own circuitry, the outputs from the two oscillators being combined and fed to a simple resistance coupled amplifier. Each oscillator output is independently adjustable and, at maximum settings, is sufficient to give 6 volts peak to peak output from the amplifier. In this design only a portion of this output is used but is mentioned in view of the

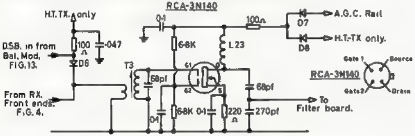


FIG. 10. 4 BAND TRANSISTORISED TRANSCEIVER - FILTER PRE-AMPLIFIER.

T3—Secondary is 40 turns of 33 gauge B. & S., close wound on Neosid 722/1 coil form and F29 slug.
L23—40 turns of 33 gauge B. & S., close wound on Neosid 722/1 coil form and F29 slug.

to the filter. However, the unit performs several quite important secondary duties in that it provides a suitable point at which to carry out TX/RX diode switching and, also, provides additional gain on receive.

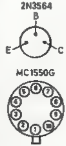
While the amplifier is certainly necessary on transmit, it is possible that, when constructing only a receiver, it would not be required. However, since it was needed for the transmitter it has been used on receive as well.

The circuit is given in Fig. 10 and uses an R.C.A. dual gate 3N140 FET as a 9 Mc. amplifier. It does not require neutralisation.

Gate 2 of the 3N140 is held at half rail potential by the 6.8/6.8K divider, but is earthed for r.f. by the 0.1 uF. by-pass.

Output to the filter board at low impedance is taken from the junction of the 68 pF. and 270 pF. capacitors

* 4 Elizabeth Street, East Brighton, Vic., 3187.
† 25 Thames Avenue, Springvale, Vic., 3171.



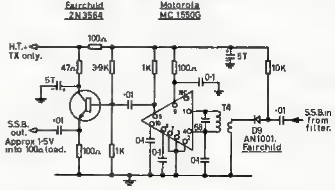


FIG. 11. 4 BAND TRANSISTORISED TRANSCEIVER.- 9 mHz TX AMPLIFIER.

T4—Secondary is 40 turns of 33 gauge B. & S., close wound on Neosid 722/1 coil form and F29 slug. Primary is 10 turns of 33 gauge B. & S., close wound over cold end of secondary.

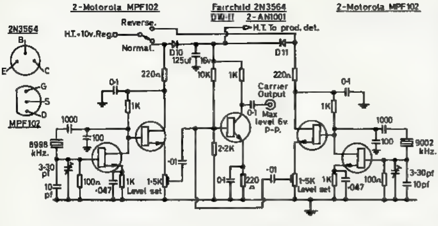


FIG. 12. 4-BAND TRANSISTORISED SIDEBAND TRANSCEIVER-CARRIER OSCILLATOR.

possibility of using the board as the basis of, say, a 7 Mc. crystal controlled transmitter.

The 3-30 pF. trimmers associated with each carrier crystal allow some adjustment of the carrier frequency so that it may be correctly placed on the skirt of the filter. This adjustment, incidentally, is very simple. A signal is tuned in on the receiver and the trimmer adjusted for best speech quality.

Each oscillator consists of a MPF102 FET direct coupled to a second MPF102 used as a source follower. The source follower acts both as a buffer stage and as a means of presenting a suitably low output impedance to the 2N3564 amplifier. The crystal is used in its parallel mode with the feedback path being provided by the 100 pF. capacitor and the parallel combination of the 3-30 pF. trimmer and the fixed 10 pF. capacity.

In other applications, using crystals of different type and frequency, it may be necessary to adjust the fixed parallel capacity.

The amplifier calls for little comment except to point out the absence of any tuned circuits. The switching involved does, however, need explanation.

As stated earlier in this series of articles, the upper sideband crystal on 8998 Kc. is the one normally used on all bands, the correct sideband for the frequency in use being automatically selected by the correct choice of the hetrodyning frequency in the injection chain. The "other" sideband for the band in use is selected by changing the carrier oscillator frequency.

H.t. is fed to either of the diodes D10 and D11 by the sideband selector switch. This switch thus chooses either the "normal" or "other" sideband for the frequency in use. If the "normal" sideband is selected then D10 will conduct and energise the 8998 Kc. oscillator while D11 blocks off voltage from the 9002 Kc. oscillator. The position is reversed if the "other" sideband is selected.

The anodes of D10 and D11 are common and from this common point h.t. for the 2N3564 amplifier and the product detector is taken.

Direct switching of the two carrier crystals could have been used but this would have meant that the physical location of the carrier oscillator/BFO would have been fixed by the switch shaft and the flexibility of this design—and the ability to set the correct output levels would have been lost. As described, all switching is done in the h.t. line and, being "cold", the switch can be placed anywhere.

THE PRODUCT DETECTOR

The circuit of the product detector is shown on the right hand side of Fig. 13.

A 9 Mc. signal from the carrier oscillator (Fig. 12) is applied to the junction of two 0.01 uF. capacitors. The right hand path takes this signal to gate 2 of the 3N140 dual gate FET detector.

The 9 Mc. s.s.b. signal from the i.f. strip (Fig. 9, Jan. 1968 "A.R.") is applied to gate 1 of the device via an 0.01 uF. capacitor.

Audio output is developed across the 2.2K drain load and unwanted products are filtered out by the 2.2K/1000 pF./2200 pF. combination.

H.t. filtering is provided by the 100 ohm resistor and 100 uF. condenser. This h.t. is applied only on receive and only when receiving sideband or c.w.

THE BALANCED MODULATOR

The circuit of the balanced modulator is shown on the left hand side of Fig. 13.

9 Mc. from the carrier oscillator/BFO is applied to a 2N3564 phase splitter to

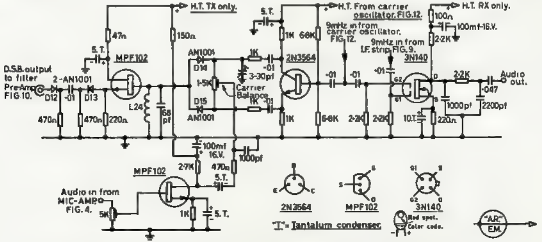


FIG. 13. PRODUCT DETECTOR & BALANCED MIXER - 4 BAND TRANSISTORISED TRANSCEIVER.

L24—40 turns of 33 gauge B. & S. enamel, close wound on Neosid 722/1 former, F29 slug.

give two equal, but 180° out of phase, signals to the balanced modulator. The balanced modulator itself consists of two Fairchild AN1001 silicon diodes.

Audio from the microphone pre-amplifier board is applied via the 5K pre-set level control to a resistance coupled MPF102 amplifier, the output of which is filtered and applied to the slider of the 1500 ohm carrier balance control.

When audio is applied to the balanced modulator it becomes unbalanced for r.f. at an audio rate and the resultant, carrier free, double sideband signal passed via the MPF102 source follower to the filter pre-amplifier.

Diodes D6 (Fig. 10), D12 and D13 are used as isolating switches.

On transmit, h.t. is applied to D6 causing it to conduct and pass signal from the balanced modulator to the filter pre-amplifier. Because a d.c. path exists to D12, it also switches on and passes signal from the source follower to D6. As h.t. is applied to the source follower on transmit only, it is acting as a further gate. D13 prevents signal from the receiver from reaching the source follower on receive.

This long chain of diode gates is necessary to prevent any signal from the balanced modulator or carrier oscillator finding its way into the i.f. strip on receive. In view of the high gain of the whole i.f. chain it was not considered that the simpler (but probably more costly) approach of switching by relay would have been successful due to leakage across the relay contacts.

If the circuitry of the carrier oscillators, the product detector and the balanced modulator are viewed outside the context of the transceiver being described, it will be seen that they represent a fairly flexible series of "packages" which can be used on their own for incorporation in other end products.

It was mentioned above that one side of the carrier oscillator could be used, with or without the amplifier, as a basis for a simple crystal controlled transmitter. Use of both sides of the board would extend this possibility to a dual frequency transmitter.

The product detector could be used on its own in other equipment and the balanced modulator could also be used in other circuits—with or without the source follower and/or switches and/or audio pre-amplifier.

AVAILABILITY

The above units are available in kit form, or as p.c.b's only, from 4 Elizabeth St., East Brighton, Vic., 3187. Prices are as follows:

(a) Filter pre-amp. and tx pre-amp., $17.50 plus 13c postage.
(b) P.c.b. only, $2.00 plus 5c postage.
(c) Carrier oscillator, balanced modulator and product detector complete in die cast box, $26.50 plus 30c postage.
(d) Carrier oscillator and amp. p.c.b., $2.00 plus 5c postage.
(e) Product det. and balanced mod. p.c.b., $2.00 plus 5c postage.
(f) Any set of instructions, $1.00 plus 5c postage.

☆

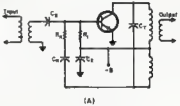
SOLID STATE COUPLING METHODS

(Continued from Page 10)

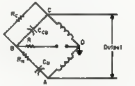
The blocking capacitor C_s in the emitter circuit keeps the supply voltage off of the emitter, and the r.f. choke keeps the emitter above a.c. ground. As a result, the positive feedback is just equal to the negative feedback, and the net result is zero, or unilateralisation.

BRIDGE NEUTRALISATION

The use of bridge neutralisation for transmitter amplifiers is well known, and has been applied without difficulty to transistor amplifiers. The equivalent resistance and capacitance of the feedback circuits have already been shown in Fig. 9. If these elements are made part of a bridge circuit, and other circuit elements are used as the other arms of the bridge, the entire circuit becomes balanced (as far as the feedback voltages are concerned) and the result is unilateralisation. A typical amplifier using such a bridge circuit is shown in Fig. 11A. The components that make up the bridge circuit are shown in Fig. 11B.



(A)



(B)

Fig. 11.—(A) Bridge unilateralisation and its equivalent circuit shown in (B).

When the ratio of the voltages in the arms A-B, B-C equal the ratio in arms C-D, D-A, no output voltage appears between B-D and the bridge is balanced. Because the phase shift is also balanced, the circuit is **unilateralised**. If a capacitor alone was found to be sufficient (C_s in the bridge arm) it would be **neutralised**.

LOCALLY AVAILABLE V.H.F. FIELD EFFECT TRANSISTORS

Number	Type of FET	Package	Cost*	Noise Figure (db.)			Gain (db.)			Forward Transfer Admittance Y_{fs} (mmhos) Freq. 1 Kc.	Reverse Transfer Capacitance (pF.) C_{rss}
				Freq.	Typical	Max.	Freq.	Min.	Typical		
2N3819	Junction	Plastic	$1.60							2 to 6.5	4 pF. max.
MPF102	Junction	Plastic	$1.13							2 to 7.5	3 pF. max.
2N4224	Junction	Metal	$3.00	200 Mc.		5 db	200 Mc.	10 db.		2 to 7.5	2 pF. max.
TIS34	Junction	Plastic	$2.00							3.5 to 6.5	2 pF. max.
2N3823	Junction	Metal	$5.38	100 Mc.		2.5 db.				3.5 to 6.5	2 pF. max.
MPF106/ 2N5485	Junction	Plastic	$1.40	100 Mc. 400 Mc.	1.6 db. 3.3 db.	2 db. 4 db.	100 Mc. 400 Mc.	18 db. 10 db.	23 db. 14 db.	2.5 to 8	1.2 pF. max.
MPF107/ 2N5486	Junction	Plastic	$1.50	100 Mc. 400 Mc.	1.6 db. 3.3 db.	2 db. 4 db.	100 Mc. 400 Mc.	18 db. 10 db	23 db. 14 db.	4 to 8	1.2 pF. max.
TIS88/ 2N5245	Junction	Plastic	$3.20	100 Mc. 400 Mc.		2 db. 4 db.	100 Mc. 400 Mc.	18 db. 10 db.		4.5 to 7.5	1 pF. max.
3N140	Dual Gate MOS FET	Metal	$2.13	200 Mc.	3.5 db.	5 db.	200 Mc.	15 db.	19 db.	6 to 18	0.03 pF. max.

* Single unit price including sales tax. (Prices believed to be correct at time of compiling table.)
This table was compiled from manufacturers' data by Eric Gray, VK2ZSB.

B.A.R.T.G. SPRING RTTY CONTEST

1969 RULES

When. 0200 G.M.T., Saturday, 15th March, until 0200 G.M.T., Monday, 17th March, 1969.

The total contest period is 48 hours, but no more than 36 hours of operation is permitted. Times spent in listening counts as operating time. The 12-hour non-operating period can be taken at any time during the contest, but "off periods" may not be less than two hours at a time. Times on and off the air must be summarised on the Log and Score Sheets.

Bands: 3.5, 7, 14, 21 and 28 Mc. Amateur bands.

Stations may not be contacted more than once on any one band. Additional contacts may be made with the same station if a different band is used.

Country Status. A.R.R.L. Country List, except KL7, KH6 and VO to be considered as separate countries.

Messages exchanged will consist of: (a) Message number, (b) Time G.M.T., (c) Country and continent.

Points:
- (a) All two-way r.t.t.y. contacts with stations within one's own country will earn TWO points.
- (b) All two-way r.t.t.y. contacts with stations outside one's own country will earn TEN points.
- (c) All stations will receive a bonus of 200 points per country including their own.

Scoring:
- (a) Two-way exchange points times total countries worked.
- (b) Total country points times number of continents worked.
- (c) Add (a) and (b) together to obtain your test score.

Sample score
- (a) Exchange points (302) times countries (10) equals 3020.
- (b) Country points (2000) times continents (3) equals 6000.
- (c) (a) and (b) added to give a score of 3020 plus 6000 equals 9020.

Logs and Score Sheets. Use one log for each band and indicate any rest periods. Logs to contain band, message number, time G.M.T. and continents. Exchange points claimed. **All Logs must be received by 5th May, 1969, to qualify.**

Awards: Certificates will be awarded to: The two top scorers in each country. The judges' decision will be final and no correspondence can be entered into in respect of incorrect entries. This is to enable the scores to be worked out more quickly and should result in more speedy publication of the results.

Send your Logs to, Ted Double, G8CDW, B.A.R.T.G. Contest Manager, 338, Windmill Hill, Enfield, Middx., England.

1968 RESULTS

The results of this contest have been received, but in view of the limited Australian participation, we will not publish the list.

Suffice to say, VK3KF finished 28th in the single operator section with a score of 26,600 points, and VK3DM was 1st in the multiple operator section with a score of 32,784 points.

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AUSTRALIAN RESULTS OF 34th A.R.R.L. DX COMPETITION

C.W. SECTION

	Score	Multi-plier	Con-tacts
VK3EO	1,968,900	226	2908
VK3APJ	1,271,411	199	2133
VK3AXK	526,373	156	1129
VK5FM	274,701	127	721
VK4FH	223,587	117	637
VK2VN	140,784	112	419
VK5FH	100,332	84	680
VK4QM	66,100	60	464
VK2AND	30,912	56	186
VK5KO	4,950	33	50
VK3QV	3,940	20	66
VK3APN*† (VK3s APN, OP, QK)	178,760	105	571
VK9GN	333,376	136	878

PHONE SECTION

	Score	Multi-plier	Con-tacts
VK2APK	1,132,950	182	2075
VK3ATN	1,074,780	210	1706
VK3AXK	270,072	121	744
VK4JE	183,240	86	730
VK4FH	105,444	87	404
VK3QV	104,331	83	419
VK5WO	33,984	48	231
VK3SM	11,528	28	167
VK2FU*† (VK2s FU, 2BKM)	2,269,716	219	3455
VK2AND* (Multi-op.)	180,888	104	580
VK9GN	655,860	170	1286

* Denotes multi-operator stations.
† Denotes Oceania champions.

N.B.—Rules for the 1969 Contest are as for 1968. See page 19 of Jan. 1968 "A.R."

Closing date for logs is 21st April, 1969, and the Contest dates are given in the Contest Calendar.

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AUSTRALIAN RESULTS OF 1968 WPX SSB CONTEST

Call	Band	Score	Contacts	Multiplr.
VK2AND	A	119,973	472	87
VK2APK	14	567,418	961	202
VK2FU	7	15,066	69	54
VK3QV	28	41,454	236	63
VK3SM	21	30,195	181	61
VK4FH	A	129,830	453	92
VK4PJ	A	8,300	60	50
VK5LC	14	23,300	128	90
VK6RU	A	317,920	682	160
VK9GN*	A	1,285,842	1787	246
VK9KS	A	133,665	369	133

* Winner of KW6EJ Trophy for highest Oceania single operator all-band classification.

Amateur Radio and the 1968 Blue Mountains Bushfires

KEN MOORE, VK2AVN*

FOLLOWING previous disastrous bushfires in 1957, the Amateurs in the Blue Mountains area examined the problem of providing the then non-existent bushfire emergency communications system. For several years the problem remained unsolved although many enthusiasts had attempted to launch such a system. By 1962 a small group of 2 metre mobile/portable stations emerged, mostly due to the driving force of Wal VK2MZ, whose energetic efforts provided portable equipment for others to operate. These mobile stations, VK2MZ, VK2NK, VK2AVN and VK2ASZ, accompanied fire tankers into the bush, while portable stations were operated by VK2QA, VK2HZ, VK2RM and VK2ABK at local fire stations. Occasionally home stations gave assistance, and the network which operated on 146.6 Mc. a.m. for a time was quite effective though limited.

Soon afterwards, however, the Blue Mountains City Council obtained low-band f.m. mobile equipment for its tankers, and there appeared to be no further need for Amateurs to provide the communication facility previously offered. From 1957 to 1968 the bushfires in the Blue Mountains were only comparatively mild outbreaks, but last year saw the culmination of a tremendous build-up of dry fuel plus long weeks of hot drying winds—an impending situation of extreme danger.

A fire which originated in September 1968 on the Kurrajong side of the Grose River, in fairly inaccessible country, built up to huge proportions in the Grose Valley until it jumped the river and crept up behind Springwood. Even though local brigades burnt back on this fire at North Springwood in the White Cross area, conditions were so bad at the time that three men caught on a section of the fire trail between two hot updrafts were burnt to death. The first was not completely extinguished and one smouldering pocket continued for weeks in Linden Gorge. This was the source of the outbreak which arose with freshening winds on Thursday, 21st November, 1968, and commenced to climb out of the gorge and move towards Faulconbridge.

By Saturday, 23rd November, this fire had crossed Grose Road and was threatening Faulconbridge and North Springwood. A strong south-westerly wind was carrying the fire towards already burnt country in the White Cross area and it was thought that it was safe at this stage. Unfortunately, although the south-westerly caused the head of the fire to move very rapidly towards the burnt ground, the terrain which was encountered by its long tail allowed it to "whip" into unburnt country to be quickly fanned into fresh paths. It was at this time that Amateur Service participation commenced.

Danny VK2ZDE had proposed that a network on 146 Mc. f.m. could be used as a back-up watch for the local brigade. Thus on Saturday, 23rd, VK2ASZ, VK2AVN and VK2ZDE moved into the fire area at North Springwood and, moving from point to point, provided communication back to local bushfire stations in the villages. To clarify this, it should be noted that the normal system available to these brigades is from their mobile unit (tanker or jeep) to a control centre—normally at Katoomba, this time at Springwood. No contact is provided with the village fire centres, so that except by telephoning the control centre, no township knows the whereabouts of its men, arrangements for relief, feeding, etc., and it is difficult for relatives to obtain information. The Amateurs' first effort was therefore to fill this gap.

On Sunday, 24th, one tongue of the fire carried across Hawkesbury Road, North Springwood, and allowed it to run wild along the ridges to Yellow Rock and on to the Nepean River near Castlereagh. Several more "whips" of this leg brought the fire close to the townships of Warrimoo and Blaxland East. At this stage two homes in the North Springwood area had been destroyed, but hundreds had been saved. About this time, the VK2 W.I.C.E.N. organisation was placed on a "standby" condition, anticipating a request to assist the Blue Mountains Amateurs. During this day, VK2ZDE and VK2AVN were joined by VK2AQX from Kingswood.

On Monday, 25th, there was not much movement of the fire, but towards evening some hot pockets had crept in close to Springwood and began to flare, causing some concern. VK2ZFZ and Associate Gerry Vale from Katoomba joined the team, together with VK2MZ from Blaxland. Allan VK2ZFZ provided a base station and with permission from the fire control officer of the local bushfire brigades Mr B Dowling the base was set up at Springwood alongside the bushfire network's own base. Stations operating that day included VK2AQX, VK2ZDE, VK2MZ, VK2ZFZ, VK2AVN and G. Vale assisted with base operation.

Communication was still provided with the villages, but a more important link was now established—a direct back-up to the Springwood control centre had been provided. From that night on, at 2000 hours, a conference was held, partly on the air, to plan the next day's operations. About that time, on Monday evening, Alf VK2ZMV called the 146 Mc control station to advise of a bad outbreak of fire behind his house which was threatening it and other houses in the vicinity. This was the first news received of this outbreak and the fire control centre was quick to follow up. Numerous tankers and men converged on Alf's QTH (including Amateur operators with knapsacks) and the fire was brought under control.

By Tuesday, 26th, some of the pockets close to Springwood had become very dangerous and several outbreaks along the perimeter, now stretching from Faulconbridge to Mt. Riverview and Blaxland East, refused to stay contained. By mid afternoon properties in the Mt Riverview area were in grave danger and a very hot fire somehow passed them and into the region of the Eastern escarpment near Emu Plains. On this day base control was taken over by VK2HZ, VK2ZDE having succumbed to a large intake of smoke, necessitating a day off. VK2ZLX journeyed from Sydney for the afternoon and evening and joined the crew consisting of VK2MZ, VK2AQX and VK2AVN. At this stage, the Sydney W.I.C.E.N. stations were asked to provide relief for the Mountains operators.

Wednesday, 27th, was an ominously quiet day with freshening winds and temperature on the rise. Mopping up operations around the great semicircle of the fire during the day left two remaining hot points by nightfall, one on the Eastern Escarpment and one near the top of Linden Gorge. During this day, VK2HZ manned the base station whilst other local operators had a day off to go to work! Mobile operation was carried on by Sydney stations VK2GN VK2VL, VK2AXJ VK2ZXD VK2ZLX and Keith L2222 who had proceeded to the Springwood Control Centre to relieve the local operators. These operators from Sydney, although strangers to the area, were able to keep communications open from areas such as the Eastern Escarpment where normal channels failed through lack of an effective relay system.

Thursday, 28th, dawned hot. Threatening gusts of wind from the west fanned the Linden Creek end of the fire across the highway and railway line above Faulconbridge. A new path was now open, through the south side of Springwood, Valley Heights, Warrimoo, Blaxland and Glenbrook, through the new village of Lapstone to Emu Plains. The fire took only a matter of hours to cover this path, pushed by a series of strong swirling fire winds of up to 80 m.p.h. About 80 homes were destroyed and scores of properties damaged. About 50 square miles of country were burnt black as this fire swept clear off the mountains to Emu Plains, still destroying property in this area. Three more lives were lost that day.

Amateur operation for the day started normally with VK2HZ and VK2EX sharing base operation with VK2MZ, VK2ZXD, VK2ZSA and VK2ZDD in the field. However it was quickly realised that this was the "blow-up" day! VK2ZDE, VK2ZFZ, VK2AVN and VK2AQX left work and re-joined the net as quickly as possible as mobiles, whilst VK2WX joined in at the base. At intervals during the week, operators would leave their sets to help in fire fighting operations. On Thursday, this became even more imperative and VK2HZ, VK2MZ, VK2AVN and VK2ZDE all stopped transmission for a period to fight successfully for their homes. Later VK2ASZ joined the expanding group and provided a trickle charger which helped to keep the bushfire control station on the air, and also a motor generator when the mains supply failed at the Springwood control centre.

When telephone services failed due to lines being destroyed by the fires, VK2HZ and VK2ZDE set up a 6 metre link to the local "metropolitan" fire station from the Springwood control centre, thus providing a very valuable service as this was the only link at the time between the two fire fighting networks.

Shortly after 1700 hours on the Thursday, VK2AWI was brought into action in Sydney—unfortunately the 146 Mc. channels at Crows Nest were rendered unusable due to some technical problems being encountered by local t.v. transmitters. Some hastily obtained cavity filters were, however, successful in removing the trouble, and while this was going on, calls for volunteers were being made and offers of assistance were causing the phone to run hot at W.I.A. Centre. The State Civil Defence Communications Officer, Mr C Allen, requested W I C E N to set up a link from the Penrith-St Marys area to assist in sorting the chaotic traffic situation on the Western Highway—blocked at some place unknown. After three Amateurs battled their way by devious routes to St. Marys C.D. Hdq., a link on 53.866 Mc. was established at the Warrimoo fire centre by VK2DU, from VK2BAU at Penrith, to the Springwood control and to VK2AWI in Sydney. The members of the Nepean Radio Club operated the 6 metre base at Penrith, using VK2BAU's equipment, and a 146 Mc. base was also set up at Penrith by VK2AWW. Others who assisted in this area were VK2ADF VK2ZNS VK2ZJN, VK2BGP, VK2BRL and Associate G Drew. Civil Defence authorities also used 3725 Kc. for a network in which VK2AMY and VK2AVA gave assistance.

Mobile patrols were established in this Warrimoo area, and duties included the relaying of "all okay" type messages from Mountains residents to relatives in Sydney, "wife to husband" type messages where they had been separated, and location of missing or evacuated persons and children. This was done because all normal telecommunication channels were reserved for urgent official traffic.

Late on the Thursday afternoon, Bob Pinning, VK2CT, who had been fighting fires in the Warrimoo area, collapsed and died. He had not been active in the Amateur net operation, but was acting as a fire-fighter in which service he unfortunately gave his life. News of this tragedy caused a noticeable hush in the Amateur net operations.

Operations on Thursday continued well into the night and took many forms, and the versatility of the Radio Amateur Service was very evident. Most of us did some evacuating of persons in danger areas, but Roland VK2AQX, in his VW bus, was very valuable in this regard. Many "quick fixes" were performed by the Amateurs on malfunctioning bushfire radio equipment, and our mobility and technical know-how gave us a very elastic usefulness.

By 0100 hours on the Friday morning the situation had eased, and W.I.C.E.N. reverted to a standby condition in these areas. Sydney Amateurs who assisted included VKs 2VL, 2AXJ, 2LL, 2GN, 2ZXD, 2ZIM, 2ZDD, 2ZSA, 2ZGB, 2BAV, 2BGP, 2ZIA, 2ZDR, 2ZRZ, 2ZTM, 2ZDD, L2121 and VK2ZAY. Most of the active fire was now at the top of Linden. It burnt steadily in this area for two more days, sometimes endangering property before it was finally contained.

The Amateurs in the mountains areas maintained bases at Springwood, Penrith and Warrimoo and mobile units were still active in the Regentville Mulgoa area, and around Linden and Springwood.

(Continued on Page 19)

* 26 Rickard Rd., Warrimoo, N.S.W., 2774.

NEW CALL SIGNS

JUNE-AUGUST, 1968

VK1CG—G. J Cashion, 51 Ainsworth St., Mawson, 2607.
VK1FT—J F. Tilley, 65 Collings St., Pearce, 2607
VK1MR—R. L Spencer, 7 Macarthur Ave., O'Connor, 2601.
VK1NW—N. J. Watling, 103 Antill St., Downer, 2602.
VK1ZUM—J. R. Messner, 148 Miller St., O'Connor, 2601.

VK2BW/T—W. J Dockrill, 63A Brians Rd., Northmead, 2152.
VK2FW—R. L. Davies, 35 Belford St., Ingleburn, 2565.
VK2II—A W Adams, 52 East St., West Dubbo, 2830.
VK2IQ—J. A. J. Waugh, 4 Astley St., Waratah, 2298.
VK2LL—P. R. Gibson, 9 Railway Pde., Eastwood, 2122.
VK2SX—R. J Linsket, Sergeants' Mess, R.A.A.F. Base, Bankstown, 2200.
VK2VK/T—C. R. Coverdale, 18 Sorrell St., Parramatta, 2150.
VK2AAU—K. P. A. Persson, 30 Dudley St., Pagewood, 2035.
VK2ADC—R. Shuetrim, 19 Stirling Cres., Lilli Pilli, 2229.
VK2AWF—B. J. Foster, "Avoca," Balla, via Gunning, 2581.
VK2AYH—J. A. Howie, 6 Kembla Ave., Chester Hill, 2162.
VK2BAN—R. R. Pisani, 99 The Kingsway, Cronulla, 2230.
VK2BAS—A. W. Sullivan, 32 Valentia Ave., Lugarno, 2210.
VK2BAU—K. Woodward, 25/46 Morehead St., Redfern, 2016.
VK2BEA—B. Nicholson, 80 Pringle Ave., Bankstown, 2200.
VK2BGA—G. A. Aitkin, 63 Wambein St., Gilgandra, 2827.
VK2BGS—G. E. Sheeran, 7 Albion Ave., Pymble, 2073.
VK2BHO—J. P. Hodkinson, 11 Burge Pl., Warilla, 2528.
VK2BJY—B. B. Jones, 23 Armarna Pde., Roseville, 2069.
VK2BKL—K. Laws, 53 Roger St., Lakemba, 2195.
VK2BMA—Macquarie Radio Club, Station: 160 Bultye St., Dubbo, 2830; Postal: Lot A, Warrigal Rd., Wongarbon, 2742.
VK2BMP—P. P. Morrow, 81 Benelong Rd., Cremorne, 2090.
VK2BMV—M. F Veevers, 46 Haig St., Wentworthville, 2145.
VK2BRA—D. R. Avery, 2 Northcote Rd., Waitara, 2077.
VK2BRG—R. G. Gibson, 142 Connels Point Rd., South Hurstville, 2221.
VK2BRS—R. D. Stephenson, 39A Cloucester Rd., Epping, 2121.
VK2BSM—S. T. Marr, 69 Brand St., Dundas, 2117
VK2BTU—R. G. Turner, 32 Railway St., Wentworthville, [redacted]
VK2ZAU—J. L. Edwards, 28 West Ave., Cessnock, 2325.
VK2ZAW—D. G. Allen, 56 Wardell Rd., Petersham, 2049.
VK2ZBK—C. B. Dein, 33 Bareena St., Strathfield 2135.
VK2ZBU—W. S. O'Donnell, 5/114 Victoria Ave., Chatswood, 2067.
VK2ZCS—A. Pollock, 15 Matthew Pde., Blaxland, 2774.
VK2ZEK—C. W. Harrison, 5 Neerim Ave., Kotara South, 2288.
VK2ZGL—P. C. Kloppenburg, 6/185 Lakemba St., Lakemba, 2195.
VK2ZHM—J. H. Mitchell, 20 Murranar Rd., Towradgi, 2518.
VK2ZIS—I. S. Miller, 77 Rae Cres., Kotara South, 2288.
VK2ZOE—P. W. Bowers, 38 Thorne St., Wagga Wagga, 2650.
VK2ZPA—L. B. Payne, 13 Seamans Ave., Speers Point, 2284.
VK2ZTG—K. W. Close, C/o. Central School, Walgett, 2385.
VK2ZVE—B. J. Evans, 1/146 Kurraba Rd., Neutral Bay, 2089.
VK2ZWY—D. R. Ashton, 1 Headland Rd., Dee Why, 2099.
VK2ZZJ—D. J Barrett, 85 Killeaton St., East St. Ives, 2075.
VK2ZZZ—G. F. Cross, 2 Wales St., Charlestown, 2290.

VK4BJ—J L. Cartmill, 4 Elwood St., Kenmore, 4069.
VK4PY—P E. Barker, M.S. 1505, Bli Bli Rd., Nambour, 4560.
VK4QV—D. H. Lane, 14 Fordham St., Wavell Heights, 4012.
VK4SE—S. S. St. George, 13 Murray St., Rockhampton, 4700.
VK4UG—D. J Richards, 12A Savannah St., Redcliffe, 4020.
VK4VV Wireless Institute of Australia, Station: Mt. Mowbullan; Postal: G.P.O. Box 638, Brisbane, 4001
VK4WR—W. M Ryan, 72 Netherton St., Nambour, 4560.
VK4ZC—H. E Davies, 903 Gold Coast Highway, Palm Beach, 4221.
VK4ZGT—G. T Ryan, 95 Railway Pde., Norman Park, 4170.
VK4ZKA—E. K. J Adams, 92 High St., Rockhampton, 4700.
VK4ZRO—E. Robinson, Station: Menso's Rd., Maidavale, via Ayr; Postal: P.O. Box 491, Ayr, 4807.
VK4ZSR—G. R. Sallaway, 74 Gordon St., Hawthorne, 4171.
VK4ZVZ—V. Richards-Smith, Flat 1, 5 Woolcock St., Red Hill, 4059.
VK5AG—A. M. Miers, 13 Hill St., Seacliff Park, 5049.
VK5CI—M S. Lang, Station Cr. Hall and Pridmore Sts., McLaren Vale, 5171, Postal P O. Box 46, McLaren Vale, 5171.
VK5FZ—W B. Johnson, 10 Hutton St., Vale Park, 5081.
VK5JD/T—G. R. Pope, 81 Leabrook Dr., Rostrevor, 5073.
VK5OI—G. N Allen, 2 Nestor St., Hillcrest, 5086.
VK5UC—W. B. R. Brooks, 22 Catherine St., Clapham, [redacted]
VK5VL—L. A. M. Voskulen, 26 Bakewell Rd., Evandale, 5069.
VK5ZBG—G. J. Hambling, 39 Hobart Rd., Henley Beach South, 5022.
VK5ZDN—P. J. Leonard, 53 Scott Ave., Flinders Park, 5025.
VK5ZEU—N. G. Scott, 35 Ann St., Salisbury, 5108.
VK5ZFE—N. H. E. Weste, 30 Farmer St., Barmera, 5345.
VK5ZIB—K. R. Zietz, 13 Fourth Ave., Everard Park, 5035.
VK5ZRE—O. W. Einicke, 30 Drysdale Cres., Campbelltown, 5074.
VK5ZWR—W. R. Chapman, 30 Hatch St., Nuriootpa, 5355.
VK5ZZX—C. J. Heath, 3 Rutland Ave., Brighton, 5048.
VK6AT—C. A. Page, The Rectory, Gnowangerup, 6335.
VK6BI—W. R. Ion, 266 Robinson Ave., Cloverdale, 6105.
VK6CB—C. E. Berg, 160 Canning H'way, South Perth, 6151
VK6CH—J. C. Hulse, 135 Wordsworth Ave., [redacted]
VK6DM—D. M. McGlinsey, Station: U.S. Navcomsta, Exmouth, 6707; Postal: P.O. [redacted] 20, Exmouth, 6707.
VK6DX—D. L. Smithdale, 57 Cotherstone Rd., Kalamunda, 6076.
VK6KM—K. M. Moore, 161 Ninth Ave., Inglewood, 6052.
VK6RZ—R. K. Philstrom, U.S. Navcomsta, Exmouth, 6707.
VK6ZGM—E. B. McAndrew, 2 Denby St., Doubleview, 6018.
VK6ZRR—K. E. Reeves, 5 Allen St., South Perth, 6151

VK8CM—C. H. Wall, Professional Officers' Quarters, Darwin Hospital, Darwin, 5790.
VK9AR—J. K. McCarthy, Station: Aboard deisel yacht "Pandemonium"; Postal: C/o. P.O., Port Moresby, P.
VK9BA—A. Buchanan, Station House 14, 6th St., Lae, N.G.; Postal: P.O. Box 723, Lae, N G.
VK9DT—A. T. G. Hanson ,Station: Minihi Ave., Section 4, Lot 3, Boroko, P.; Postal: P.O Box 1373, Boroko, P.
VK9LD—R. Drinkrow, Station June Valley, Port Moresby, P., Postal. C/o. Box 1144, Boroko, P
VK9RD—R. Doty, Station Nukui Village, Siwai, South Bougainville, N.G., Postal: Landmark Baptist College, via Konga, Free Bag. Buin P.O., South Bougainville, N.G.
VK9VG—G. W Van Galen, Station: No. 66, Fifth St., Lae, N.G., Postal: P.O. Box 723, Lae, N G.

CANCELLATIONS

VK1RS—R. D. Stephenson. Now VK2BRS.
VK1TW—T E. Woolley Not renewed.
VK1WB—W B Brooks. Now VK5UC.
VK1ZCG—G J Cashion Now VK1CG.
VK1ZGX—P G. M. Bruer Transferred Interstate.
VK1ZJY—B B Jones Now VK2BJY.
VK1ZRX—J F Tilley. Now VK1FT.
VK2BZ—H E. Davies. Now VK4ZC.
VK2DT—A. R. Harrison. Deceased.
VK2GQ—E. Barlow. Deceased.
VK2OE—W M. Allworth. Deceased.
VK2SB—R. W. Chaplin. Not renewed.
VK2SE—A. E. Wright. Deceased.
VK2WL—L. R. Hodge. Now VK1WL.
VK2XJ—F Broome. Not renewed.
VK2AAC—G Cochrane. Not renewed.
VK2AAN—M Butler Transferred Interstate.
VK2AET - Kogarah Evening College Radio Club. Not renewed.
VK2AFQ—R E. McIntosh. Deceased.
VK2AIL/T—D. E. Law. Overseas.
VK2AJU—M. G. Burleigh. Now VK6JU.
VK2AQD/T—R. B. McPhee. Not renewed.
VK2ATM—T W Marks. Transferred Interstate.
VK2AVY—W. Rogers. Transferred to U S.A.
VK2AWT—N J. Watling. Now VK1NW.
VK2BFB—F B. Crum. Overseas.
VK2BSA—Boy Scouts' Assoc. (N.S.W. Branch). Not renewed
VK2ZAU—K. Woodward. Now VK2BAU.
VK2ZCC/T—C. R. Coverdale. Now VK2VK/T.
VK2ZCM—J Linden Transferred Interstate.
VK2ZCS—A. W Sullivan. Now VK2BAS.
VK2ZDO/T—W. J. Dockrill. Now VK2BW/T.
VK2ZEH—G. D. L. Armstrong Now VK6ZEV.
VK2ZEY—A. A. Campbell. Not renewed.
VK2ZHX—J. P. Hodkinson Now VK2BHO.
VK2ZJO—J. A. J. Waugh. Now VK2IQ.
VK2ZKK—K. J. Callaghan. Not renewed.
VK2ZNV—M. F. Veevers. Now VK2BMV.
VK2ZPG—P R Gibson. Now VK2LL.
VK2ZRN—R. L. Davies. Now VK2FW.
VK2ZSN—R. Shuetrim Now VK2ADC.
VK2ZTE—R. G. Gibson. Now VK2BRG.
VK2ZTR—R. G. Turner Now VK2BTU.
VK2ZUF—P J Ford. Not renewed.
VK2ZVL—K. Laws. Now VK2BKL.
VK4ZAV—J L. Cartmill. Now VK4BJ.
VK5VK—W P Kempster. Ceased operation.
VK5YF—L. F Sawford Deceased.
VK5ZAP/T—G. R. Pope. Now VK5JD/T.
VK5ZDL—J. M Shaw. Transferred to Victoria.
VK5ZIK—D. W Carr. Ceased operation.
VK5ZKN—N K Kohler. Now VK5DV.
VK5ZUL—L. A. M Voskulen Now VK5VL.
VK6OB—D. B. O'Brien. Not renewed.
VK6SG—S. S. St. George. Now VK4SE.
VK6ZAB—H Iffla. Not renewed.
VK6ZBT—K. M Moore. Now VK6KM.
VK6ZCC—M. L. O'Rourke. Not renewed.
VK6ZEM—B. M. McDonald. Ceased operation.
VK6ZFC—R J. Campbell. Leaving country.
VK6ZGK—P. C. Kloppenburg. Now VK2ZGL.
VK8AD—A. M. Miers. Now VK5AG.
VK8AU—D. D. Tanner Now VK3AUU.
VK8NM—M S. Lang. Now VK5CI.
VK9AG—A. G. Nunn. Transferred to Victoria.
VK9GW—G. K. Williamson. Not renewed.
VK9HI—L. C. Raebel. Transferred to Q'land.
VK9RJ—R. J. Wirth. Transferred to Nauru.
VK9ZGW—G. W. Van Galen. Now VK9VG.

THE QUESTIONNAIRE—A PROGRESS REPORT

All replies received up to and including 24th December have been taken into account. The final returns were better than we had really expected, the returns representing 30.3% of our circulation. The individual State results were:

VK1-2	26.6%	VK5-8	30.8%
VK3	37.3%	VK6	27.25%
VK4-9	35.9%	VK7	28.6%

In addition, replies were received from U.S.A. and New Zealand.

We believe we have a fairly accurate cross-section of the Amateur ranks and interests, so feel reasonably confident that the figures we will produce will be an accurate indication of our readers' interests. At this time we have not processed the answers to all the questions, hence our report will be spread over several issues.

MONEY SPENT

During the last two years the break-up of money spent shows:

- 29.3% spent less than $100.
- 28.2% spent between $100 & $200.
- 12.7% spent between $200 & $300.
- 6.32% spent between $300 & $400.
- 6.18% spent between $400 & $500.
- 4.8% spent between $500 & $600.
- 11.75% spent over $600.

Just on 1.5% did not answer this question.

In order to make an estimate of what money is spent on Amateur Radio per year, we took the middle figure of each range, i.e. $150, for $100 to $200 range, etc., but this left us with the problem of what to use as a realistic figure for those in the "over $600" bracket. We, therefore, spoke to a few of those who had spent over $600 and asked what they estimated they had spent. From their replies we estimated that $850 would be a fair average, so used this figure in our calculations. On these figures we estimate that Amateurs are spending in the vicinity of $560,000 per year in Australia, or an average of $132 each.

The State averages came to:

VK1-2	$131	VK5-8	$108½
VK3	$132½	VK6	$165
VK4-9	$147½	VK7	$136

Indications are that the spending will be much the same over the next couple of years as to the question on future spending, 41.7% said they would spend the same, 28.4% will spend more, and 26.4% less. When broken down into brackets, we get future spending as follows:

	Spend Same	Spend More	Spend Less
Under $100	47.0%	42.5%	10.5%
$100-$200	52.5%	33.8%	13.7%
$200-300	35.5%	34.0%	30.5%
$300-$400	37.0%	16.1%	46.9%
$400-$500	38.0%	16.5%	45.5%
$500-$600	35.2%	—	64.8%
Over $600	26.3%	5.75%	67.9%

Although we did not ask what those contemplating extra spending had programmed, quite a number indicated what they had in mind and comments such as "going s.s.b." and "contemplating a transceiver" were frequent. We hope that at a later date to find time to analyse the future spending on a "per State" basis.

TYPE OF EQUIPMENT

On the subject of type of equipment, 53.2% are mainly "home-brew", 30.6% mainly commercial, and 16.2% reported 50/50. The findings on a State by Sate basis are:

	Home-Brew	Commercial	50/50
VK1-2	51.0%	30.5%	18.5%
VK3	52.0%	34.2%	13.8%
VK4-9	48.5%	32.3%	19.2%
VK5-8	70.4%	19.3%	17.3%
VK6	49.5%	39.2%	11.3%
VK7	65.8%	20.7%	13.4%

Undoubtedly the high percentage of commercial gear in VK6 accounts for their high "per capita" spending, and by the same token the small percentage of commercial gear in VK5 explains their low per capita expenditure. It would be interesting to know why VK5 and VK7 have so much more home-brew equipment than the other States, and we hope this may be revealed as we analyse the figures on operating modes and bands.

ADVERTISING SPACE

The question regarding what space should be allocated to advertising presented the main problem. Where two amounts were ringed, we have taken the higher figure. Those who wrote such comments as "as much as you can get", etc., have been listed as no opinion, giving the following results:

20% advertising space	8.2%
30% " "	33.0%
40% " "	24.8%
50% " "	16.7%
60% " "	7.6%
No opinion	9.9%

The State by State voting was reasonably even as the following table shows:

Space	VK 1-2 %	VK3 %	VK 4-9 %	VK 5-8 %	VK6 %	VK7 %
20%	9.7	7.75	7.9	7.0	4.5	12.0
30%	32.8	31.4	31.8	35.6	41.0	30.0
40%	23.8	25.0	25.2	24.4	26.8	26.9
50%	16.25	16.5	19.8	16.3	8.9	17.9
60%	8.9	7.5	6.0	8.75	5.5	6.0
No opinion	8.7	11.8	9.0	8.1	13.3	7.2

These findings confirm our opinion that 30% to 40% of space allocation to advertising was what the majority wanted, and this was the range we have aimed at in previous years. This is contrary to the policy of most magazines which appear to aim at a figure between 60% and 70%. How long we can maintain the lower space allocation is a matter of economics and the final decision cannot be reached until we know wat we are going to get for the magazine after our new approach for a price increase is considered at Easter next.

EMPLOYMENT IN THE ELECTRONICS INDUSTRY

To wind up this month's progress report we shall briefly cover the matter of employment in the electronics industry. The national average is 38.8%. Again the States show fairly consistent figures as can be seen from the following table:

VK1-2	44.25%	VK5-8	36.6%
VK3	35.4%	VK6	44.5%
VK4-9	34.7%	VK7	37.4%

We should mention the reason for grouping certain call areas together is to conform with our circulation figures which are grouped the same way.

Next month we will deal with the readers' preferences.

☆

VK2 BUSHFIRES

(Continued from Page 17)

Networks were officially closed at Springwood on Friday night and at Penrith on Saturday morning. All members remained on call, however, for several days, but the situation was relieved by rainfall.

A de-briefing was scheduled for 11th December at St. Marys for participating groups to enumerate lessons learnt and enable preparation for the next time to be undertaken.

I feel that the general result of this operation was a wonderful shot in the arm to relations between the Amateur Service and the fire-fighting organisations in N.S.W. The Bushfire Committee Radio Officer, Mr H. Freeman (VK2BHF), Inspector W. Hodder, the Blue Mountains District Inspector N.S.W Fire Brigades, the Blue Mountains Fire Control Officer (Mr. B. Dowling) and many others associated with the control centre at Springwood were all very generous in their praise of our efforts.

A lot of the traffic we passed, e.g. fire reports, personnel movements, etc., were duplicates of messages passed on other networks, but nevertheless essential in our "back-up" function. However, in many instances the Amateur networks were the primary conveyors of messages and information and the fire controllers soon learnt our value! I also feel that the guys involved require a really good pat on the back for their part in an unrehearsed net operation which proved to be very successful.

Before concluding, let me quote a wise comment from Bill VK2HZ: "It is practically impossible to get a full picture of all activity and assistance rendered by the many Amateurs, some of whom journeyed from Sydney to assist. Everyone was so busy in net operations that an individual story of each Amateur's work could never be recorded. I should only like to thank all those involved for their excellent co-operation and assistance." To these remarks I should like to add my own personal thanks and to say that due largely to my own involvement in this operation I may have done some inaccurate reporting, or omitted a call sign. If I have, please accept my apologies and understand that the residents of the mountains have undergone a severe crisis in recent weeks. We wish to say to all . . . your help was wonderful.

(Acknowledgments to VK2HZ and VK2ZJN who helped me by filling in gaps and with helpful comments, and to VK2GN for additional information.)

☆

CONTEST CALENDAR

- 1st/16th Feb.—A.R.R.L. Novice Round-up.
- 15th/16th Feb.—35th A.R.R.L. DX Test (c.w. section, 1st week-end)
- 1st/2nd Mar.—35th A.R.R.L. DX Test (phone section, 2nd week-end).
- 8th/9th Mar.—32nd B.E.R.U Contest (R.S.G.B.)
- 15th/16th Mar.—35th A.R.R.L. DX Test (c.w section, 2nd week-end)

D. Rankin, VK3QV, F.E.

DX

Sub-Editor: PETER NESBIT, VK3APN
32 The Grange, East Malvern, Vic., 3145

(All times in GMT)

ASSORTED

It is reported that I stations will shortly use location prefixes as follows: I1 Special services, I2 Milan, I3 Venice, I4 Bologna, I5 Florence, I6 Bari, I7 Naples, I8 Reggio Calabria, I9 Piedmont, I0 Rome. The islands will remain as IT1, IS1, etc. (Good news for the prefix hunters.)

While on the subject of prefixes, DX1 is a new one that has just been issued. DX1AAV (ex W3JTC), who works for the American Embassy in Manila, says that the prefix will be used by visitors to the Philippines. At present there are no others using DX1, but there should be three more on shortly. As yet there is no reciprocal licensing arrangement, but the matter is being looked in to. Larry says he will be there until June. His QSL address is given below.

Earl WA6UZB plans to make a DX-pedition to Clipperton Is. and Monaco this May. He is particularly interested in making contacts with VK/ZL.

Those OM prefixes that everyone was talking about a couple of months ago were allotted to about 300 OK stations, to celebrate the 50th Anniversary of the Independence of Czechoslovakia. The prefix was due to expire last December—the 15th.

U.K. Amateurs are now permitted to send their call signs at 20 words per minute instead of 12 !!

VE6AJT/VE6APV DX-pedition: Don and George are reported to have signed /KB6 for a short while from Canton Is. prior to their departure for KS6. Don is said to have plans to link up with KH6GLU when the latter goes to FW8 about 1st Feb. for 10-14 days of operation on all bands including 160 mx (hat)

VE2BUJ/SU QSLs: VE2NV asks stations not to QSL via the VE2 Bureau, as he has not heard from Gerry for 15 months, and no logs are available.

Malpelo Island, HK0: K4PHY, K8JGS, W4IBA and TI2CMF are reported to be going there for one week in February.

BAND NEWS

Rolf HC8RS is said to operate 21275 s.s.b. daily at 22/24z.

WB4GCL/YB0 is reported QRV since Dec. 12, 14203 s.s.b. daily at 10/16z. QSL information below.

Carlos 7G1CG is said to sked WA2HUP on 21300-320 s.s.b. about 21z, with WA2HUP on earlier to arrange skeds.

Sid 5N2AAX is QRV daily 7040 at 0600-0630z. This would be a real challenge for long path; a sked for about 07z might be the best shot.

ZS2MI (Marion Is.): Ron is generally QRV Mondays/Wednesdays/Fridays about 14180 a.m. at 0300-0330z. He skeds Dennis ZS6DF most days 14315 s.s.b. at 04z. If you work Dennis he will arrange a sked for you.

HL9WK Rod (ex W7YBX) is QRV all bands 80-10 mx c.w.-s.s.b. He skeds his QSL manager K7CHT on 14215 s.s.b. at 14z Sats. and 05z Suns., QRV for other stations before/after the skeds. Skeds can also be made via K7CHT.

QSL MANAGERS

CE0AT—CE3ZN
CR6LF—W3HNK.
EA6AR—DL7FT.
ET3REL—W5LEF.
FB8XX—FR7ZD.
FM7WV—F3KK.
FO8AA—W5IXQ.
HC8RS—SM5EAC.
HK0BMO—WA6AHF.
HL9WK—K7CHT.
HS3VV—W1ETU.
HV3SJ W6KNH.
JX5CI—LA5CL
KV4FA—K3AHN.
MP4MBJ G3POA.
OY5NS—K1QLT.
PJ2MI—VE3EUU.
SK2AZ SM2BHX.
TA2EM W0DAK.
TA2SC K4EPL.
TA3AB—W1MQT.
TA3X WA7GQA.
TF2WLN WA3BZO.
TG9RN DL3RK.
TL8GL VE2DCY.
TU2AZ—DL7FT.
VP2GBR—WA5IEV.
VP2VY—KV4EY.
VQ8CG—G3APA
VR1P VE6AO
VR2FS—9V1OS.
VS5MH DL3RK.
VS5RCS—9M2NF
VS9MB/Colin—W2CTN.
VS9MB/John G3KDB.
VU2JA—W2CTN
XW8CAL—VE6AO
ZB2AY K3RLY
ZB2VY G3VCN
ZD8RK W9VNG.
ZD9BE—W2GHK.
ZS2MI—ZS6OB.
ZS3BS—WB2RLK.
ZS3LU -W2CTN.
3A0AV—I1ZBS.
3A0EK—DL2WB.
4S7DA—W6FJ
4W1ADO—HB9ADO.
5N2NAS—G3VIS.
5U7AN—W4WHF.
5W1AR—W4ZXI
6O1GB—W1YRC.
6W8DQ—W2MES.
7X0AH VE3DLC
8QALK—VU2OLK.
8QAYL—4S7YL.
9F3USA—VE3IG.
9H1M—K2GGN.
9K2BV—W3EGR.
9M2DW—W6CUF.

DX1AAV—C/o. American Embassy, A.P.O., San Francisco, U.S.A., [redacted]
EA8CF—Box 860, Las Palmas, Canary Is.
EA8FF—Box 860, Las Palmas, Canary Is.
KA1IJ Via K8WXV/1, D. Janicki, 161 First Ave., South Portland, Maine, U.S.A., 04106.
KV4FZ (ex W0VXO) Box 310, Christiansted, St. Croix, U.S. Virgin Is.
M1I—Fast QSL via Ivo Grandoni, Rep. of San Marino.
PJ0CC—Via W2TA (ex W2ADE), J. Doremus, Pocono Rd., Mountain Lakes, N.J., 07046.
VS6DO—P. Bailey, C/o. Police Hdq., Arsenal St., Hong Kong.
WB4GCL/YB0—C/o. American Embassy, A.P.O., San Francisco, 96346.
YB0AR—Gunungsari 51, Djakarta, Indonesia.

ACTIVITIES

The new 5B DXCC Award has certainly given a much needed boost to the ailing sport of DXing. Overseas stations are quite enthusiastic about the award, and there has been plenty of the clean crisp operating that makes DX hunting so enjoyable. (To clear up any misconceptions about the rules, DXCC can be worked on any five Amateur bands. The rules in last month's issue did not make this completely clear.)

Reg VK4VX has been stacking up DX after DX in his log book over the past few months. He has averaged more than 60 countries per month on 20 mx c.w./s.s.b. Reg says that conditions are so good at the moment that it should be possible to work 100 countries on 20 mx within one month. A whole foolscap page listing stations worked supports this. The list abounds with DX, perhaps the best being AC5CP at 1045z on c.w. Also one 6Z0AA at 1023z (??).

Al VK4SS says that 10 mx is beginning to fall off now, but 15 mx should remain good for another season or two. Al sent a list of stations worked on 15 mx c.w. and a few on 20 mx, and it appears that most parts of the world are workable on 15 mx between 8 and 11 p.m. E.A.S.T. The main activity is in the first 50 Kc. Al says that 20 mx is excellent to South Africa around 17z. Can anyone please help with the QRA of 6W8AW?

Fred VK4RF also sent in a huge list of DX worked, all 20 mx s.s.b. The most apparent feature of the list is the large numbers of African and Middle East stations worked. There are plenty of rare ones, including TX0AH, TU2AY, 4U0TIC and so on. Unfortunately space does not allow us to print the full list, but be assured that now is the time to pick up countries on 20 mx.

George L6042 has been maintaining an almost nightly check on three African c.w. stations, KPH, WNU and WCC, which are just above 2 Mc. The idea behind this investigation has been to see how many times per month these stations could be heard, and use the information to predict openings on 160 mx. George has just completed an analysis covering the last 14 months on the above stations, and a definite pattern emerges showing peak conditions at the equinoxes and a very definite low at our winter solstice. There is a null in our summer soltice as well, but not as low as one would expect. (Evidence of one-way skip? Ed.)

George says it is pretty obvious that the short path to W6/7 on 160 is open quite often and Amateur QSOs would have been possible on a number of dates were it not for the fact that local time there would be around 03/04. Latest heard

Dec. 7—1116-1124z, 1805 Kc. W1BB.
" 14—1342-1442z, 1993 Kc., W6QHQ, W6GEN (trans-pacific test).
" 15—1126-1203z, 1803//4 Kc., W8ANO, VE3QU.
" 15—1155-1203z, 1990 Kc. VE3QU.

DXCC AWARD AMENDMENT

(Not 5B DXCC) Issued free of charge to A.R.R.L. members; others remit $4.00 for DXCC Award, and $1.00 with each endorsement. In addition, send sufficient postage for return of QSLs, preferably sufficient for 1st class regd. mail.

SUMMARY

I would like to thank the gang of ever helpful VKs who keep this column supplied with information. Remember, news is always needed. Acknowledgments to DX News, LIDXA, FLADXA, ZL2AFZ, G3UGT, VK4SS, VK4RF, VK4VX and last but not least L6042. Good hunting chaps. 73, Peter VK3APN.

SILENT KEY

It is with deep regret that we record the passing of the following Amateurs:

VK2CT—R. B. Pinning.
VK3GZ—Max Folie.

FEDERAL QSL BUREAU

Latest details on the proposed DX-pedition to Norfolk Island and Cocos-Keeling Islands by Jack Sinyser, W6BPO, and Bob James, W4WS (ex W4CHA), indicate they will arive in Sydney on 9th February and will be operative from Norfolk for two days from 12th February. They are scheduled to arrive in Perth about 24th Feb. and at Cocos on 26th Feb. Owing to the infrequent air schedules to Cocos (every three weeks) it is not certain that Jack will be able to make the Cocos trip as he must be back on his job early in March, but Bob, who is retired, will definitely make the Cocos location. The Cocos operation will last for two to three weeks. At both venues, Jack will sign VK2BPO/9 and Bob will sign VK2BRJ/9.

A visitor to Australia early in March will be K6KA. His schedule provides a stay in Melbourne from 28th Feb. to 3rd March. Information on his movements may be obtained from either VK3AKB or VK3TE. He may be operative from Norfolk Island under the call sign of VK9KA.

A new award sponsored by the Gaucho Radio Club, Brazil, is called the C-20-B Award. Information on the requirements may be obtained from this Bureau.

The National Amateur Radio Union of Greece has issued a set of awards. They have sent details of the requirements which may be obtained from this Bureau.

R.E.F. member, S.w.l. F15906, Pierre Galtier, Box X, Vieux Fort, 94 Vincennes, again complains that VK stations will not QSL even when he includes an I.R.C. He lists 12 VK stations who have converted his I.R.C. to other uses. What about it fellows, no matter what your views on S.w.l. reports, it is dishonest and discourteous to ignore an I.R.C. report. If your cards are too costly to "waste" on S.w.l's, reply on a piece of paper.

Bruno, HB9QO, who worked in VK a few years back, has now migrated to VK. He reached Melbourne with XYL and child on 4th January. Bruno, wisely, would prefer to settle in Melbourne, but employment opportunities in the electronic field are greater in Sydney, so it appears that Sydney will be his permanent location.

Bureau statistics for the year 1968 show a total of 41,674 cards handled. This compares with 89,334 in 1967 and 79,463 in 1966. The 1968 total would have been 10,000 lower if the Russians had observed the new arrangements earlier than October. At long last am getting a breather!

"CQs" from July 1967 to May 1968 inclusive are available gratis on personal application at this Bureau. First up best dressed and no phone reservations. Good hunting, good health and good QSL results in 1969.

—Ray Jones, VK3RJ, Manager.

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

REMEMBRANCE DAY CONTEST

Editor "A.R.," Dear Sir,

I have a bone to chew over about the Remembrance Day Contest. It was stated in the results for 1968 in the November issue that "VK7DK's tally of 1822 points for 13¾ hours of operating could stand as a record for some time". Evidently this statement was made having done no research into the results of previous contests or that the points obtained for Amateurs in VK0, VK1, VK8 and VK9 mean nothing and don't count.

On going back through previous results to 1960, I find that this score has been exceeded by two Amateurs, VK0WH 1920 points in 1960, and VK0CR 2076 points in 1967, so how can Den's commendable result be still considered a record? I think for the first time the 2000 point mark was exceeded last year.

I had not really thought about the rules for the R.D. Contest before the above inaccuracy appeared, but now feel on reflecting that the contest treats those in the VK0, VK1, VK8 and VK9 areas as the ugly ducklings. Surely these scattered Amateurs in these areas could be treated for the purpose of such a contest as a separate division and as such eligible for award of the trophy should results indicate so. I imagine quite a number of the chaps in these areas are members of the W.I.A. to various Divisions. If there were points for percentage of Amateurs participating for 1967 and 1968 I feel sure Antarctica would win hands down with a 50% participation rate.

What about it chaps? Aren't these outlying Amateurs who give us so much of our interesting DX worth consideration as regards our own domestic contests? I definitely think so, what say you?

—Rodney Champness, VK3UG.

ERRORS IN R.D. CONTEST RESULTS

Editor "A.R.," Dear Sir,

Regarding the R.D. Contest results, I believe an error has crept in. The station VK3ASW/P is shown in the open section with 1083 points. It should, I think, read VK3AFW/P as I operated this station (VK3AFW/P) and claimed 1083 points for the "open" and cannot find my call sign elsewhere. It appears that there is a misprint or a strange co-incidence.

—R. R. Cook, VK3AFW.

Editor "A.R.," Dear Sir,

It appears that in the R.D. results, page 11, November issue, a small mistake has been made. Instead of VK7ZL as top VK7 c.w. score, it should read VK7FB. I don't think there is a VK7ZL, but 7ZL is part of my postal address. I deny the inference that I used a 10kw. b.c. transmitter in the contest, hi, hi! I am sure this is correct as the points score is the same as I claimed.

—Mike Jenner, VK7FB.

Wireless Institute of Australia
Victorian Division

A.O.C.P. CLASS

Morse:
THURSDAY, 6th FEB., 1969

Theory:
TUESDAY, 18th FEB., 1969

Theory is held on Tuesday evenings, and Morse and Regulations on Thursday evenings, 8 to 10 p.m.

Persons desirous of being enrolled should communicate with Secretary W.I.A., Victorian Division, P.O. Box 36, East Melbourne, Vic., 3002 (Phone 41-3535, 10 a.m. to 3 p.m.)

PAINTON TECHNICAL DATA

A series of technical leaflets and brochures on a range of connectors, resistors, switches, r.f. chokes and a variety of other components is available from Painton (Australia) Pty. Ltd. Readers are asked to note Painton's new address: Painton (Aust.) Pty. Ltd., 29 Railway Ave., Huntingdale, Vic., 3166. Phone 569-0931.

HAMADS

Minimum $1 for forty words.
Extra words, 3 cents each.

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Advertisements under this heading will be accepted only from Amateurs and S.w.l's. The Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. Copy must be received at **P.O. 36, East Melbourne, Vic., 3002, by 5th of the month and remittance must accompany the advertisement.**

COLLINS S-Line 75S-3B Receiver, 32S-3 Transmitter, 516F-2 Power Supply; perfect condition. Cost $2,500, will sell for $1,100 firm. S-Line complete with cables, microphone, speaker and 240v./115v. transformer. Also for sale Heath HA-14 Linear Amplifier, $75. Newtronics 10-80 mx Vertical, $30. VK2ADC, Ray Shustrim, 19 Stirling Cres., Lilli Pilli, N.S.W., 2229. Tel. 524-3893.

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FOR SALE. Heath SB-400 s.s.b. 5-band Transmitter. Built-in a.c. p.s., vox, etc. Clean condition. Performs well. $325 o.n.o. W. J. Bell, VK3WK, Wangoom, Vic., 3279. Phone Grasmere 94-225.

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SELL. Galaxy V., as new, manual, circuit, some spare tubes. $400. Channel Master Auto. Rotator, complete, ball race thrust bearing, new, in carton, $50. Two identical AVA filters, 5285 kc., carrier xtals, for de luxe transceiver or cascade, $25. Pair Philips QB3-300 tubes, bases, $10. Bendix Compass Rx, professionally improved, a.m., s.s.b., with 20 mx and 15 mx xtal converters, built-in p.s., $40 o.n.o. A.W.A. xtal calibrator, 1 Mc., 100 Kc., 50 Kc., in-built p.s., $10. 1155 Rx, front-end and i.f. goes, battered, $7. D. Fisher, P.O. Box 53, Dapto, N.S.W., 2530. Phone Wollongong 61-2144.

SELL. Swan Transceiver complete with vox, p.t.t., a.l.c., 240v. a.c. and 12v. d.c. power supplies, connecting cords and speaker, full coverage 80, 40 and 20 mx bands. $350. VK4XY, G. G. Down, 57 Gearside St., Everton Park, Brisbane, Qld., 4053.

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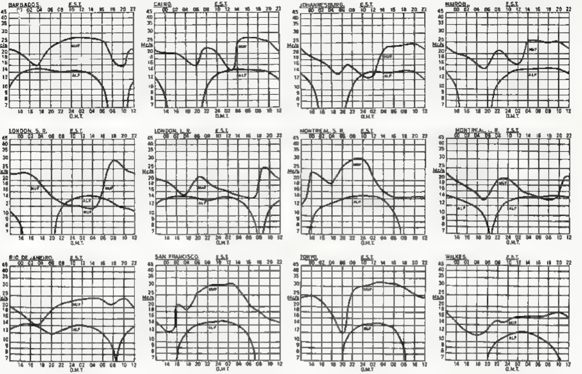
PREDICTION CHARTS FOR FEBRUARY 1969

(Prediction Charts by courtesy of Ionospheric Prediction Service)



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